

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 259. (No. 49, Vol. V.)

DECEMBER 6, 1913.

[Registered at the G.P.O.] [Weekly, Price 3d.
as a Newspaper. Post Free, 34d.]

Flight.

Editorial Office: 44, ST. MARTIN'S LANE, LONDON, W.C.
Telegrams: Truditur, Westrand, London. Telephone: Gerrard 1828.
Annual Subscription Rates, Post Free.
United Kingdom ... 15s. od. Abroad ... 20s. od.

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EDITORIAL COMMENT.

The First Lord as Pilot.

Mr. Churchill's keenness to enter into all the details of the Service of which he is the titular head, has taken him a step farther, and he may now claim to be the first of all Cabinet Ministers to actually assume control of an aeroplane in flight. His flight was accomplished on a Short biplane, on which he ascended from Eastchurch with the late Capt. Wildman Lushington. When the machine had reached an altitude of about 500 ft., Mr. Churchill took over the dual control and flew the machine quite successfully for three-quarters of an hour, during which time he traversed a distance of nearly forty miles. Naturally, the First Lord's flight has given rise to a great deal of comment and discussion. The *Westminster Gazette* takes him severely to task for his temerity, and says:—

"Mr. Churchill on Saturday went for three separate aeroplane flights as a passenger, and in the third flight (lasting nearly an hour) 'it is understood' that Mr. Churchill personally took control of the machine. Col. Seely is also a Minister who has flown on more than one occasion, if we remember aright. We feel bound to say that we think these Ministerial flights are thoroughly ill-advised and mischievous. They serve no sort of useful object, as it seems to us,

and there is something more than that, since from at least one point of view they are decidedly harmful. In the early days of the submarine Lord Fisher made it a strict rule that no one in the Navy should go down in a submarine unless it was part of his duty to take the risk. The adventurous admiral was not allowed to dive, and it would be well if a similar veto were placed on Ministerial flights. If Ministers fly there is a practical compulsion on other people to do the same, on the pain of some reflection of their courage. Every branch of the Services ought to run its own risks, and no one can assert that it is part of a Minister's duty to do what is no doubt in itself exciting and adventurous. We hope we shall have no more of these unnecessary risks run for no sort of useful purpose."

The *Pall Mall Gazette*, on the other hand, comments thus:—

"It is a new departure in Ministerial life which we applaud, so long as the caution proper to a member of the Cabinet be mingled with the daring expected of the soldier. Whatever fault may be found with the administration either of Mr. Churchill or Col. Seely, this much must be said for them: that they have shown more sympathy and understanding of the daily life of the Services they control than any of their predecessors."

Of the two, we rather prefer the tone of the *Pall Mall's* comment, for that of the *Westminster* seems to us to carry rather too much of the panic feeling with it. Unfortunately, however, the death of Capt. Wildman Lushington coming so very shortly after Mr. Churchill's flight with him certainly drives home the conviction to the ordinary person that in making these flights our Ministers are assuredly taking some measure of risk. We would point out, however, that Capt. Lushington's death at this particular moment is simply one of those fortuitous circumstances which have a habit of happening, if we may be allowed to use the term in so sad a case, at the wrong time. Had even a month elapsed, we venture to say that no particular moral would have been drawn from it. As a matter of fact, while we should be the last to contend that there is no danger in flying, we do say that it has now become so safe a pursuit that, ordinarily speaking, the risks have become negligible. There is really no more risk—or very little more—in flying than there is in crossing a crowded London street. Indeed, if we are to take literally many of the things we hear said about traffic risks in London, then flying is immeasurably safer than crossing the road.

We do not think much of the *Westminster's* argument that when Cabinet Ministers fly they make it practically a point of honour for the higher officers of both Services to follow the example—that is what we take it our contemporary means. Surely, every responsible officer

may be left to judge for himself whether or not it is necessary for him to go so deeply into the detail of things that he must qualify as an aerial pilot. We do not ask our generals to qualify as scientific artillerymen, for instance, nor do we accuse them of incompetence or slackness if they are unable to pass the examinations laid down for battery commanders. Nor do all our admirals possess the practical knowledge of an engineer-commander.

On public grounds it is as well that our responsible Ministers should not take undue risks, and we concede that, taking all the circumstances into account, it will perhaps be as well if the heads of the fighting Services, now that they have both tasted of the joys of flying, and may be said to have quite a fair personal knowledge of aircraft and their control, should remain on *terra firma* for the future. Then there can be no talk of risk, and everyone will be pleased.

Sign-Posting Aerial Highways.

In view of the difficulty which air pilots must have in recognising the vicinity of "prohibited" areas, our French contemporary, *Le Temps*, has been discussing the possibility of sign-posting aerial highways. According to this journal, the French military authorities have under consideration a scheme for the erection of signs, visible at a distance of two and a half miles from a height of three thousand feet, marking the route from Paris to Nancy, on the German frontier, in the hope that the Germans will follow the example on their part of the Paris-Berlin route.

The idea is an excellent one, and is, moreover, one that sooner or later will have to be adopted, not only for the indication of "prohibited" areas, but in order that travelling airmen may be able to find their way from point to point without difficulty. In this country it sounds like a far cry from where we are to the marking out of aerial highways, but it must be borne in mind that it is not yet ten years since it seemed that flying at all was even farther off. The march of development is so rapid in modern times that we literally do not know what to-morrow is likely to bring forth. No doubt in the days to come, the main routes of the air will be staked out with the same elaboration as are the national highways of France, and the wandering airman of the future will be able to fix his whereabouts with the same facility that is enjoyed by the motorist of to-day. Moreover, the suggestion of airways is no new idea, as the readers of *FLIGHT* are well aware.

PHILIPPE MARTY. PILOT.

ALTHOUGH since July last, when he joined the Grahame-White Aviation Co. at Hendon, Philippe Marty has been recognised, by his masterly handling of the Morane-Saulnier machine, as a very fine monoplane pilot, it may be recalled that it was on the Caudron biplane that he "won his spurs." After several years at college, where he took a course in mechanical engineering, Marty, in June, 1911, within two months of attaining the age of eighteen, went to the Caudron works, determined to learn the aeroplane business thoroughly. To this end he spent some months in gaining practical knowledge as to the construction of the machines, and then went on to give his attention to the fitting and tuning up of motors, &c.

In February of last year he commenced his *apprentissage de pilote*, and in a month was the proud possessor of Ae.C.F. *brevet* No. 816. Soon after this he gave exhibition flights on the Caudron in various parts of France, and over here at Edinburgh and Hendon, while he had

The Kite and Model Aeroplane Association.

In our correspondence columns will be found a letter from the Chairman of the Research Committee of the Kite and Model Aeroplane Association, setting forth the necessity for making the Association a rather more scientific body than it has hitherto been. We agree entirely with the views expressed by Dr. Thurston in the letter in question.

No doubt in ten years' time we shall smile at what will be regarded as the crude knowledge of to-day, for there is still a long road to be travelled before we can reach a stage of even comparative perfection of the aeroplane. That means that there is much research and inventive work to be done, and it is to the younger generation of those interested in flight that we look to carry out that work. We have always held the view that the best introduction the younger member of the flying community can have to the movement is through the model section. By his association with this side of it, he learns much of the scientific factors which enter into the problem of dynamic flight; by association with those equally keen he is given opportunity for useful discussion, which is good for himself and those with him; and he necessarily learns much that will stand him in good stead when he comes to tackle the larger problems of actual flight. It follows that the more scientific this preliminary training can be made, the more thorough will this early education be, and the better equipped will be the individual for his future work. It is an aspect of the art which parents should lay well to heart.

The scheme outlined for the establishing of research laboratories is approved by Sir Hiram Maxim, to whom Dr. Thurston's letter was submitted. In a communication to the Hon. Secretary of the Association, Sir Hiram says:—

"It would certainly be advantageous to have some kind of a laboratory where experiments could be made and practical knowledge obtained. We are at the beginning of a totally new epoch in the history of the world. Flying machines are bound to work a complete revolution in the affairs of nations with each other. They cannot fail to do much to prevent warfare between the great Powers of the world, and I wish the new enterprise every success."

Whether we agree with Sir Hiram's views on the aeroplane as a preventative of war or not, we join with him in wishing success to the new venture.

some experience with the Caudron hydro-aeroplane at Boulogne. In April of this year he beat the French height records for pilot and three and four passengers, and flew from Paris to London, during which, on being brought down at Canterbury by a refractory motor, he was arrested by the police, but without serious consequences. In the following month he put up two very fine flights for the Coupe Pommery, in one going 600 kiloms., while the second trip, from Crotoy, was brought to a conclusion by a broken propeller at Dusseldorf, after flying 450 kiloms.

He also made several cross-country trips in France on the Caudron monoplane, including one from Paris to Crotoy, and another from Crotoy to Rouen, these flights being to qualify for a superior *brevet*.

His work at Hendon during the past few months is, we are sure, too fresh in the minds of our readers to need repetition here.

"THE HAWK."

DECEMBER 6, 1913.

FLIGHT

MEN OF MOMENT IN THE WORLD OF FLIGHT.



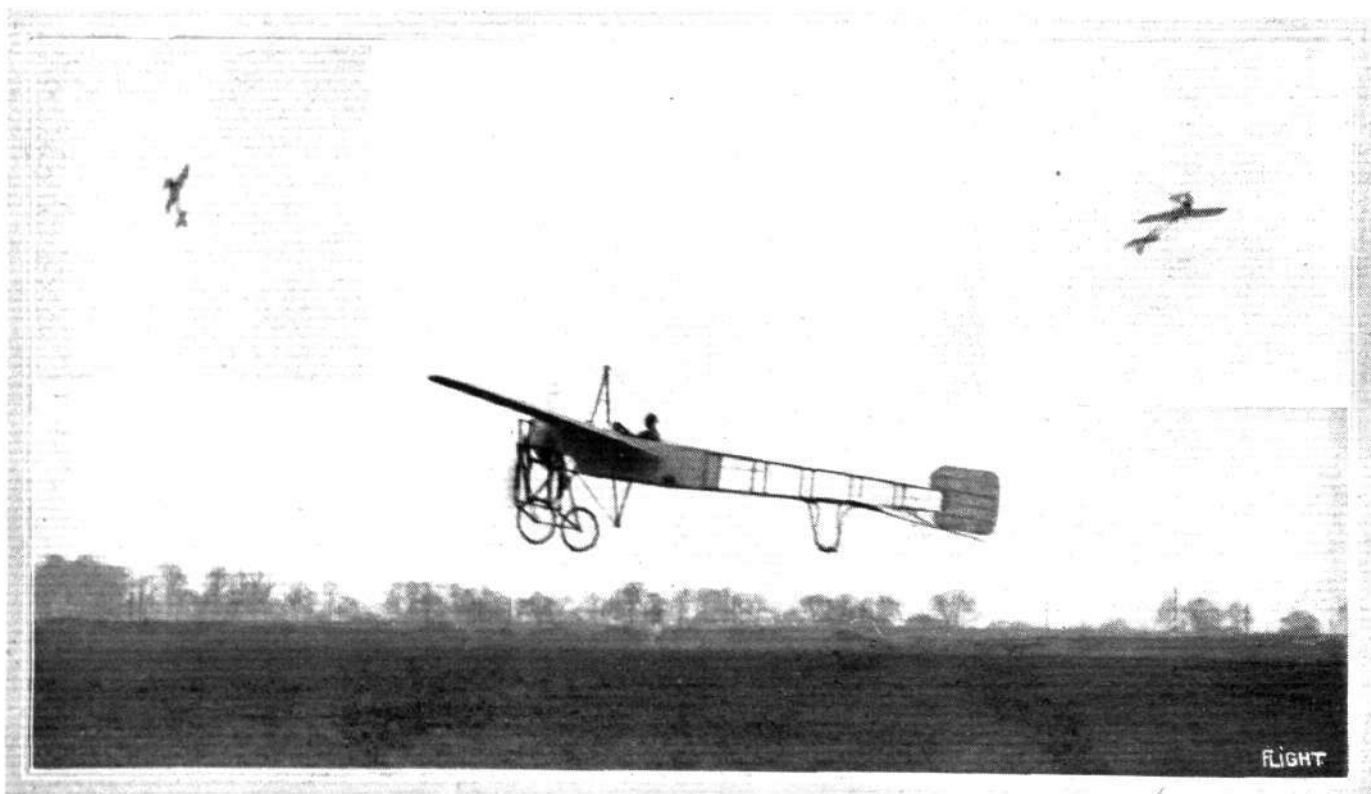
MR. PHILIPPE MARTY.

FLYING AT HENDON.

LAST week has been a busy and memorable one for Hendon, for several records have been made there. On Monday G. L. Temple accomplished the first up-side-down flight in Great Britain, on his Blériot monoplane, on Wednesday B. C. Hucks gave a private demonstration of looping the loop in the clouds. The next afternoon, Thursday, he gave his first public performance in England of upside down flying and looping the loop, and the new Willows airship made its first flight the same day. On Saturday, B. C. Hucks repeated his fine demonstrations of inverted airmanship, whilst Gustav Hamel had the satisfaction of looping the loop on his Morane-Saulnier. Yet another event of importance was the first appearance of the latest Sopwith biplane, a remarkable little machine which appears to be the fastest biplane yet produced. In addition to these important episodes, the usual exhibition and passenger flights were put up on the Thursday, Saturday and Sunday, which together with the above topsy-turvy demonstrations we refer to in detail below.

On Thursday there was not much wind, and the sky was cloudy during the early part of the afternoon but clear after 3.30 p.m., when Hucks came out. Some 15,000 people assembled in the various enclosures, which, considering the day and the time of the year, was a remarkably good attendance. At 2.15 p.m., F. P. Raynham arrived from Brooklands on the 80 h.p. Avro biplane, and shortly after the Grahame-White stud, including Louis Noel on the Maurice Farman, and R. H. Carr on the 100 h.p. Green-G.-W. 'bus with two passengers, turned out and gave exhibitions. A little later, W. L. Brock, with a passenger on the 80 h.p. Blériot, and Pierre Verrier on the Maurice Farman went up, the latter executing some of his steeply banked turns. At 3 o'clock Gustav Hamel ascended on his 80 h.p. Morane-Saulnier, which has had a stronger *cabane* and extra stout wing cables fitted. After reaching a height of about 4,000 ft. he executed some astonishing dives, banks and turns. Some of these dives and banks were quite vertical, and at one time it looked as though he had succeeded in turning his machine upside down. After these evolutions he descended into the aerodrome with an exceedingly steep switchback dive. In the meantime, W. Strange went up on a 50 h.p. G.-W. 'bus, and at 3.20 B. C. Hucks started off on his 50 h.p. Blériot for his upside-down demonstrations. He climbed steadily for some time, and we noticed that while he was doing so his engine was not running at its best. In fact he told us on landing that it stopped on several occasions owing to a derangement in the pressure-feed

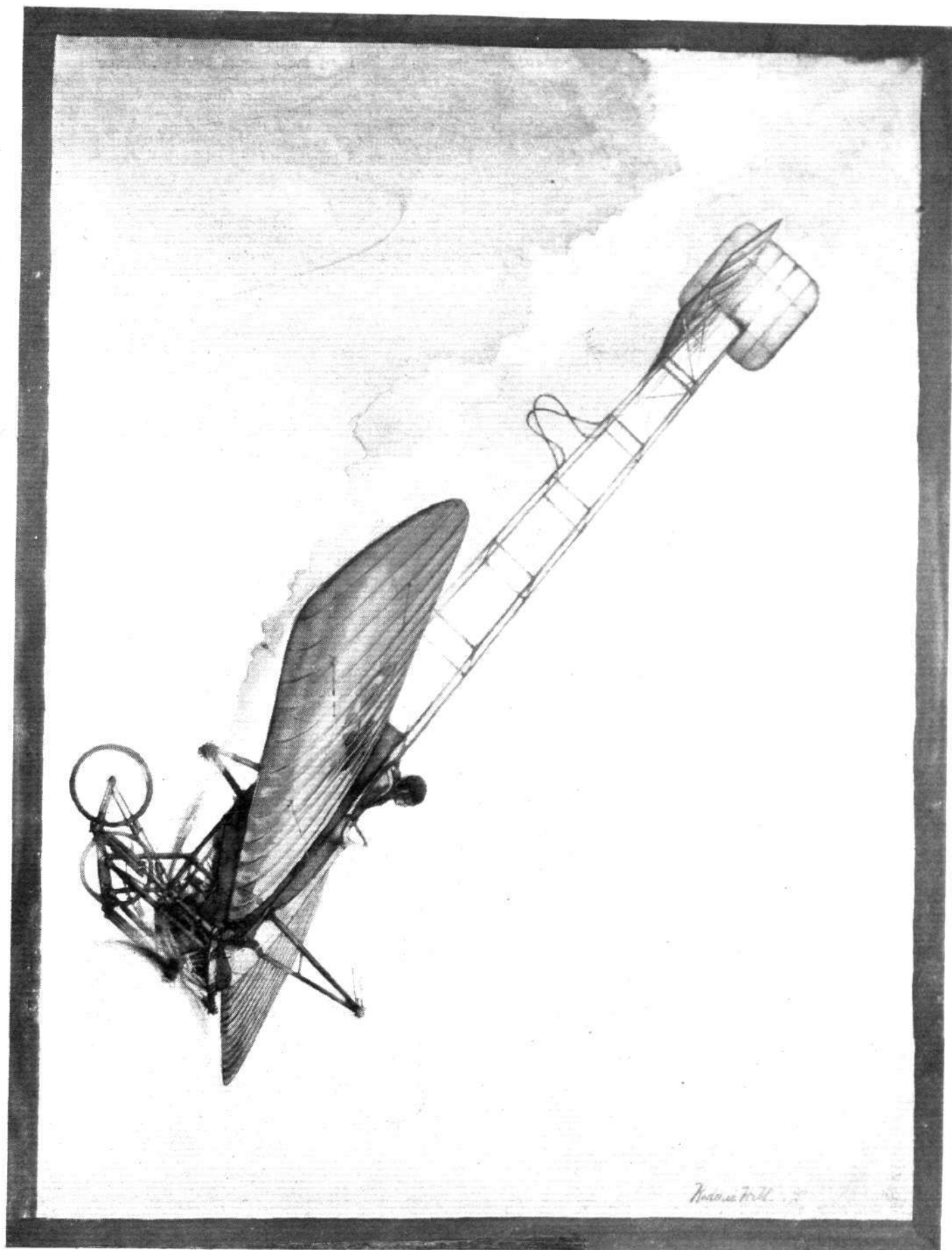
system for the petrol. Eventually, however, he reached an altitude of about 3,000 ft., from which height he made two S's, in one of which he remained up-side down for about ten seconds. His altitude was then 2,000 ft., and after flying a little towards the centre of the aerodrome he made two complete loops, one after the other. He was not more than 1,000 ft. up when he had completed the second loop, after which he made a dive to about 700 ft., and then, much to everyone's surprise, he made another loop before descending. When he did descend there was a pandemonium of cheering, clapping of hands, and hooting of motor horns, which was emphatically repeated when he was carried along the enclosures on the G.-W. land 'bus. After a short interval, during which exhibitions were given by Hamel on his Morane-Saulnier, Raynham on the Avro, Brock on the Blériot, Slack on the Morane-Saulnier, and the Willows airship was brought out of its shed, Hucks ascended for the second time. He climbed until he was about 1,500 ft., and then made a loop, after which he climbed to about 2,000 ft., when he made four loops in succession. These loops were perfectly formed, and by the time the last one was completed he was not more than 800 ft. from the ground. At this height he then executed some very fine banked turns, but his engine still giving trouble he descended. On leaving his machine he was carried shoulder high to the refreshment pavilion, where, much against his will, he had to celebrate the occasion. The low altitude and exceedingly neat way in which the loops are made are the two features that make the aerial exhibition of Hucks the most impressive that has been seen in this country. There is no doubt about what he does. His evolutions are as clear as though he were making a *brevet* figure eight, and with due respect to Pegoud, and the splendid fact that he was the first to perform this new mode of flying, we cannot say that we were impressed to the same extent when we saw that daring Frenchman at Brooklands, as we have been by Hucks at Hendon. These demonstrations completed, the various machines returned to their sheds, some making a final flight or two before doing so. In the meanwhile, efforts were being made to get the 60 h.p. E.N.V. engine of the Willows airship tuned up, but it was not until about 5.30 that a trip was made in the dark. This cruise lasted for about 15 mins., and terminated in a somewhat exciting manner. Mr. Willows was in charge with two passengers, and after making a successful turn round the Aerodrome they steered for the shed and stopped the engine, but those below could



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LOOPING THE LOOP.—Mr. B. C. Hucks just off on his Blériot for his looping demonstrations. Inset on the left he is seen going up on the first part of the loop. On the right, inset, he is seen actually upside down during the looping.



THE FIRST ENGLISHMAN TO LOOP THE LOOP.—An impression of Mr. B. C. Hucks flying in an inverted position at Hendon Aerodrome on Saturday, November 29th, on a 50 h.p. Blériot with reinforced wing bracing. From an original drawing by Mr. Roderic Hill.



AN INCIDENT AT HENDON LAST WEEK-END.—Two little children, aged 5 and 8 years respectively, were so fascinated with the flying that their parents arranged to gratify their wish for a practical experience—something *under "half-price"* being charged. Our photo shows Mr. Louis Noel on the M. Farman 'bus just about to start with his precious freight.

not see the airship in the dark, and were therefore unable to secure the landing ropes, and as all efforts to start the engine were in vain, the airship drifted towards the railway embankment adjoining the Aerodrome. Before anything serious occurred, however, those on the ground managed to secure the guide ropes, and with the assistance of several willing volunteers she was safely docked.

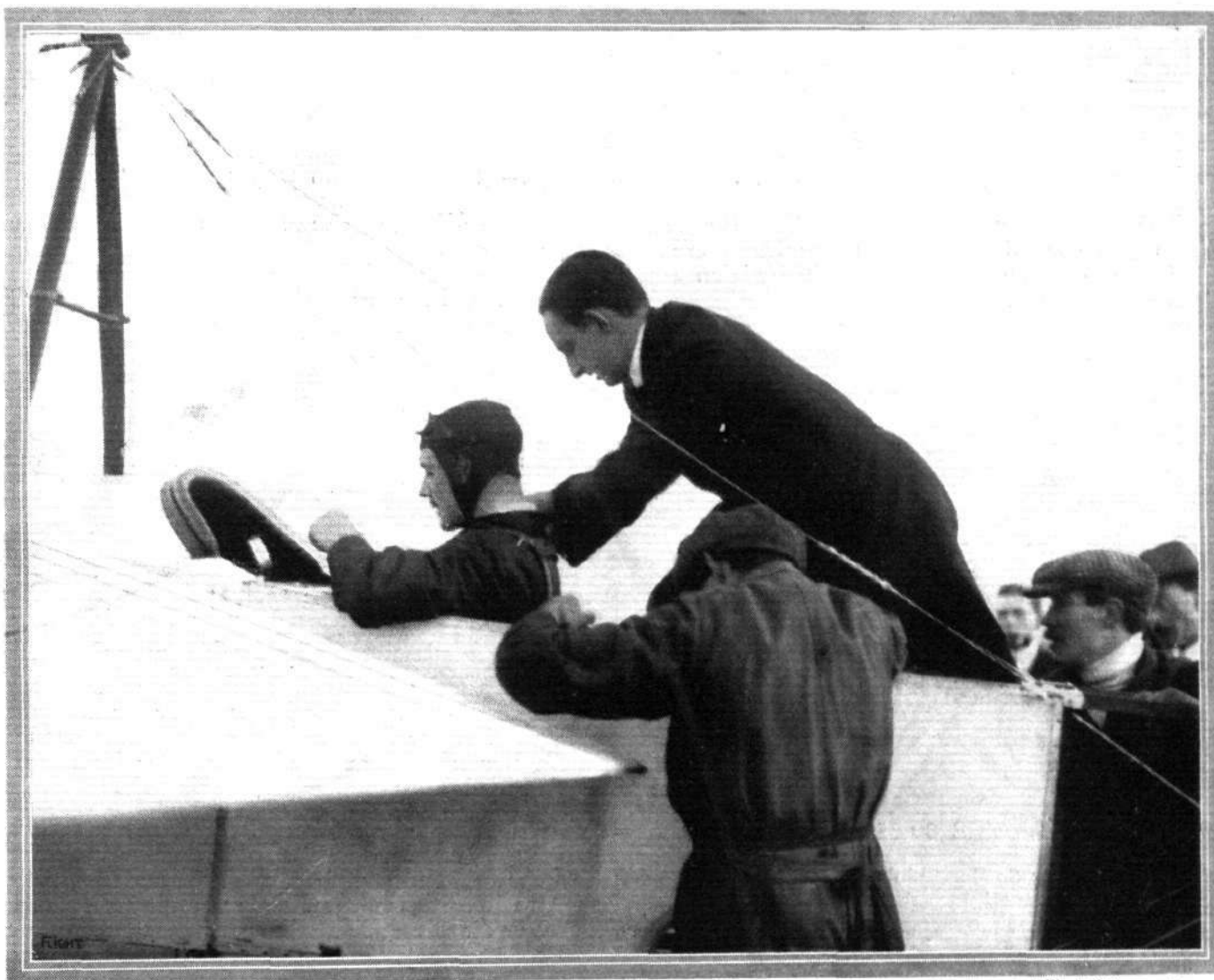
As was expected, a bigger crowd than ever turned up on Saturday, which was fine and sunny. From quite an early hour people and cars arrived at the Aerodrome, and at one time the whole of Colindale Avenue was blocked with cars and pedestrians. It was estimated that nearly 50,000 passed the turnstiles. The overture, which started shortly after 2 o'clock, consisted of a simultaneous display by seven pilots, viz., Louis Noel on the Maurice Farman, R. H. Carr, on the 100 h.p. 'bus, Marcus D. Manton on his 50 h.p. G.-W. 'bus, R. Slack on the 80 h.p. Morane-Saulnier, N. Spratt on the 130 h.p. Canton-Unné Breguet, W. L. Brock with a passenger on the 80 h.p. Blériot, and E. Baumann on the 60 h.p. Caudron. Brock and Baumann both ascended to an altitude of well over 5,000 ft., and at times appeared to hover motionless, so strong was the wind up high. After this the two other G.-W. 'buses made their appearance, piloted by W. Birchenough and W. Strange. Philippe Marty then took over the 80 h.p. Morane-Saulnier and made a fine flight with a passenger, Verrier on the Maurice Farman and Strange with a passenger on the G.-W. 'bus following immediately after. A machine was then seen approaching at a great rate over West Hendon. This turned out to be the new 80 h.p. Gnome-Sopwith biplane, piloted by H. Hawker. On entering the aerodrome he made two complete circuits at an astounding speed, which Mr. Reynolds estimated at nearly 90 miles an hour. In general appearance this machine is very similar to the other Sopwith machines, but is considerably smaller. That morning it had undergone a test at Farnborough, when a maximum speed of 92 miles an hour was attained, and a minimum speed of 36.9 miles per hour. The machine also climbed to an altitude of 1,200 ft. in one minute. These feats, which are world's records, were accomplished whilst carrying a passenger and fuel for 2½ hours; the machine weighs 680 lbs. unladen. From 3 o'clock until 4.30 numerous exhibition and passenger flights were made by Manton (50 h.p. G.-W.), Spratt (130 h.p. Breguet), Carr (100 h.p. G.-W. 'bus), Verrier (70 h.p. Maurice Farman), Temple and Brock (Blériots), Dyott (Dyott mono.), Noel (Maurice Farman), and M. Osipenko (G.-W. 'bus). The latter pilot narrowly escaped a serious accident, for, on rising, he stalled the machine,



Mr. Hawker flying the remarkable new Sopwith tractor biplane at Hendon last Saturday. "Flight" Copyright.

which came down with some considerable force, and was very badly smashed. The pilot, however, was unhurt. In the meanwhile Hamel had ascended on his 80 h.p. Morane-Saulnier to a height of about 5,000 ft., and his movements were anxiously followed. Suddenly, when over the Welsh Harp, he made a nose dive, and then turned the machine upwards as if to make a loop, but he could not bring the nose over and the machine remained motionless with its tail downwards for nearly a second, and then slid tail first for about 1,000 ft. How he got the machine back again into its normal position was difficult to see, but he did, and started to climb again to his former height. When this was attained he made another attempt to loop the loop, and this time he appeared to succeed. The machine only just managed to turn over at the top of the loop, and, as far as we could see, came out of the inverted position by a side dive. Before he descended, Hamel made a sharply-banked turn, the upper wing-tip apparently passing over the vertical. As soon as

using this star as a guide to the movements of the aeroplane, it was seen that the latter was drifting absolutely backwards. Turning out of the wind he drifted sideways across the aerodrome, and then turned the machine over and flew in this position for 12 secs., then righting the machine by means of a nose dive. He then made a loop, followed shortly by two more, finishing up with a loop at about 500 ft. from the ground. As he descended it was noticed that the tail of the machine was distinctly twisted in relation to the fuselage, which was undoubtedly due to the force of the wind. On landing, it was found that the tubular tail-stays had buckled, so further demonstrations were out of the question. No one grumbled, however, for Hucks had given a magnificent display, and appreciation of this fact was enthusiastically demonstrated by the crowd. The proceedings of the day were brought to a close by some passenger flights by Hamel on the 80 h.p. Blériot—one of his passengers being the Countess Dudley—and Carr on the 100 h.p. 'bus, whilst several of the other pilots made short flights before turning in.



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Mr. B. C. Hucks before looping the loop at Hendon having his shoulder-straps fixed safely by his Manager, Mr. J. C. Savage.

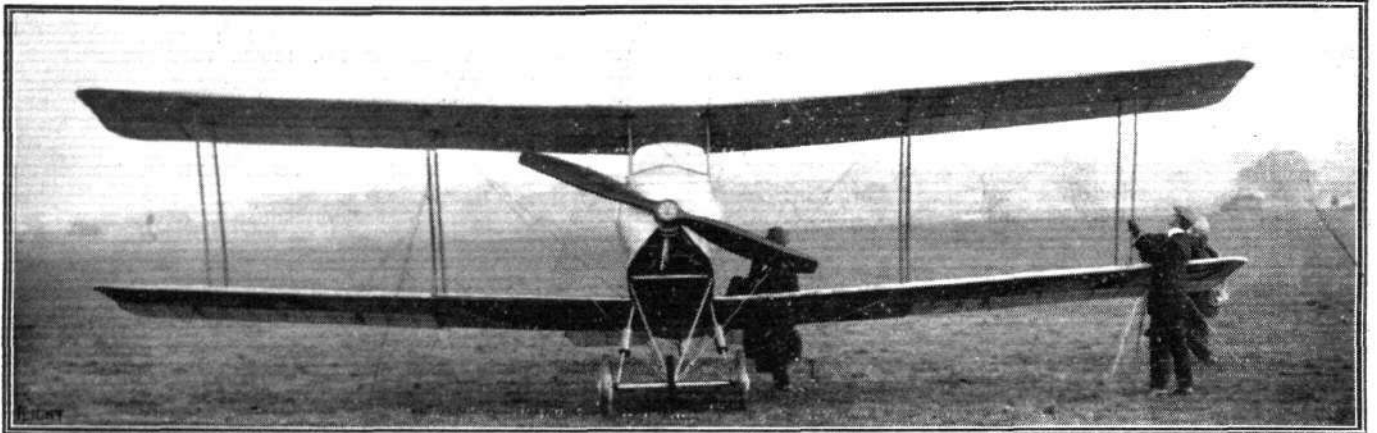
Hamel landed, Hucks came out on his 50 h.p. Blériot and commenced to climb. The engine was running much better on this occasion, an air bag having been fitted which kept up a constant air pressure for supplying the engine with petrol. It took Hucks some considerable time to reach an altitude of 3,000 ft., owing to the strong wind, which caused him to drift right over West Hendon, where he dived and turned the monoplane over on its back. He travelled in this position for a few seconds, and then righted the machine by means of a corkscrew-twist. He then started towards the centre of the aerodrome, climbing all the time, but progressed so slowly that he was obliged to make a dive in order to make headway. At last, when about over the railway, he made three loops in succession from about 2,500 ft., falling 1,000 ft. in doing so. Then ensued a stiff fight with the wind in striving to regain a suitable position over the centre of the aerodrome. Watching him through a strong pair of glasses, the writer noticed a star in line with the tail of the machine;

On Sunday, several exhibition and passenger flights were made in good but dull weather before a fairly large attendance. Gustav Hamel put up some more fine flights on his 80 h.p. Morane-Saulnier, executing several steep dives and vertical banks. He was aloft for about 20 mins., over West Hendon. Henri Salmet made his first flight on a Blériot since his recent mishap. G. L. Temple and W. L. Brock also made flights on their Blériots, the former having to make a hurried descent owing to engine failure. The same thing happened on the day before, and on an examination being made of the engine it was found that some rivets had got inside the cylinders, how, remains to be seen. Other pilots out were:—K. H. Carr on the 100 h.p. G.W. 'bus with full complement of passengers, Louis Noel—who took a little boy and a little girl on the Maurice Farman—Pierre Verrier on the Maurice Farman, Philippe Marty and R. Slack on Morane-Saulniers, Marcus D. Manton and W. Birchenough on G.-W. 'buses, and Whitehouse on the Handley Page biplane.

THE 80 H.P. AVRO BIPLANE.

It is not so very long ago that really high speed was almost invariably associated with the monoplane type of aeroplane; the biplane being looked upon as more

most monoplanes, and which, moreover, has the advantage that it can be landed at a speed which is very much below its normal flying speed. As a matter of fact the



THE 80 H.P. AVRO BIPLANE.—View from the front.

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suitable for weight carrying at comparatively slow speeds. Things alter rapidly in the aviation world, however, and what seems to be a fantastic dream to-day is an accomplished fact to-morrow.

new Avro biplane possesses a speed range of very nearly 50 per cent.

A good idea of the general arrangement should be gained from the accompanying illustrations. It will be

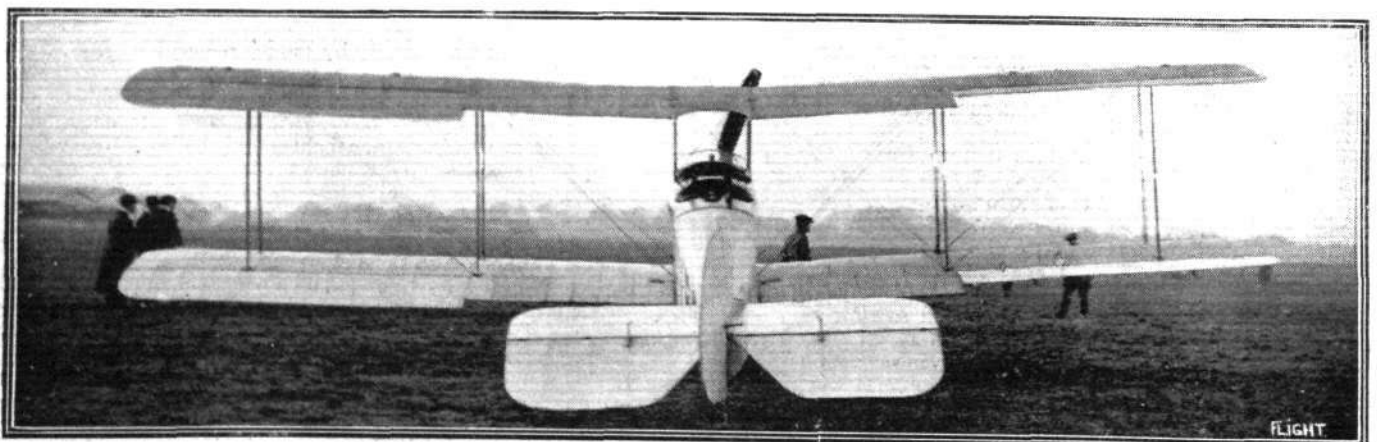


THE 80 H.P. AVRO BIPLANE.—Three-quarter view from the front.

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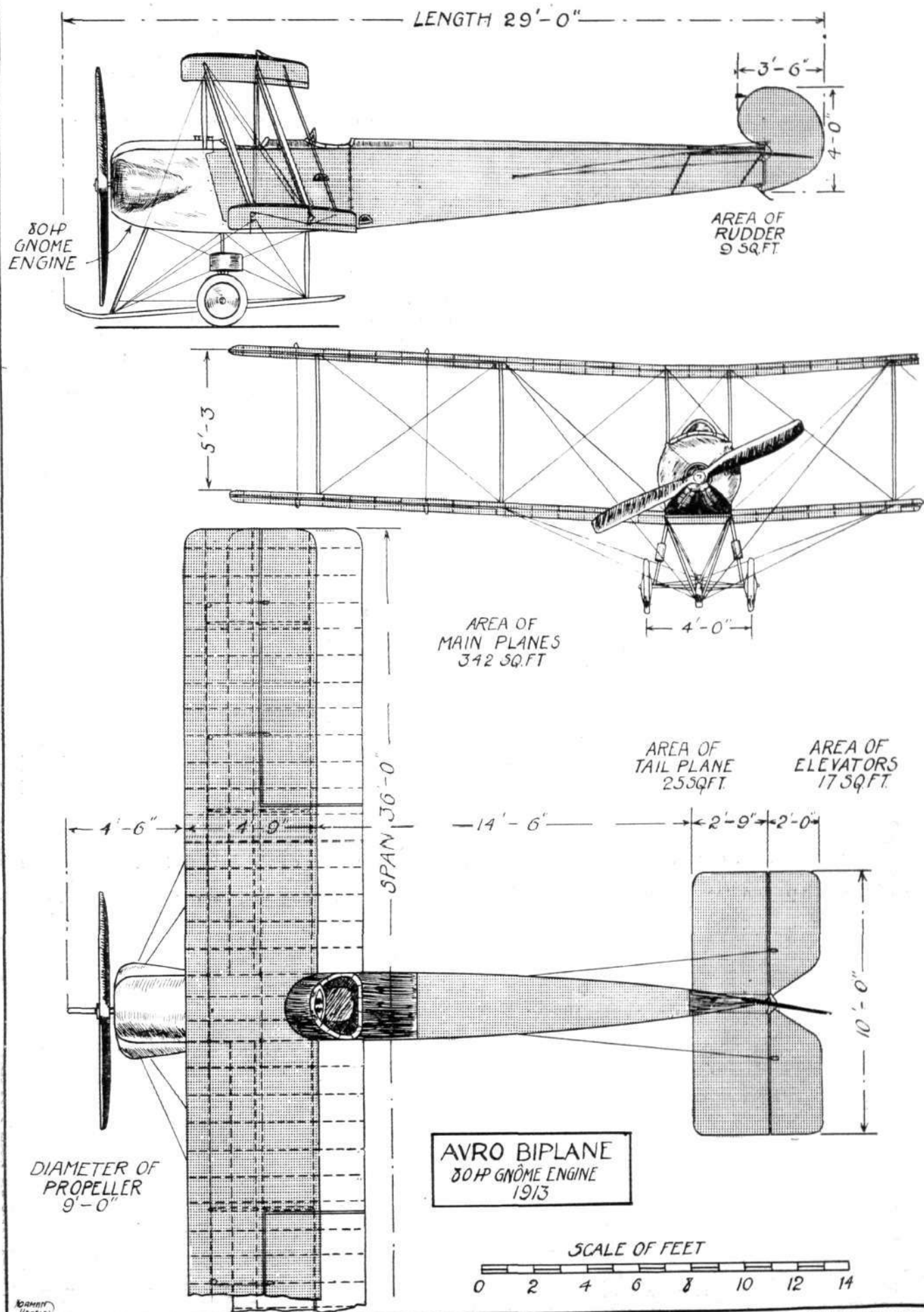
With his new 80 h.p. biplane, Mr. A. V. Roe has proved that it is possible to-day to produce a machine of the biplane type which is as fast as, if not faster than,

seen that the most noticeable departure from the usual Avro practice is the staggering of the main planes, the reason for this no doubt being, that for the same gap and



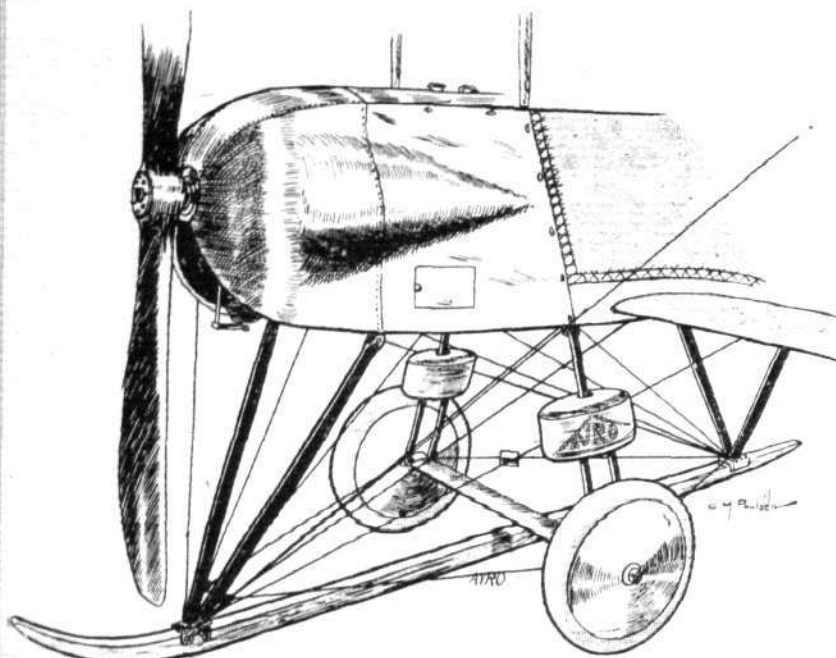
THE 80 H.P. AVRO BIPLANE.—As seen from behind.

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THE 80 H.P. AVRO BIPLANE.—Plan, side and front elevation to scale.

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Sketch showing the neat engine housing and the chassis of the 80 h.p. Avro biplane.

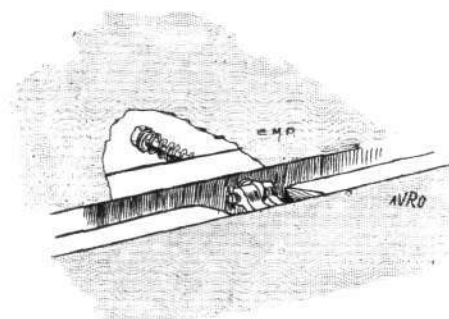
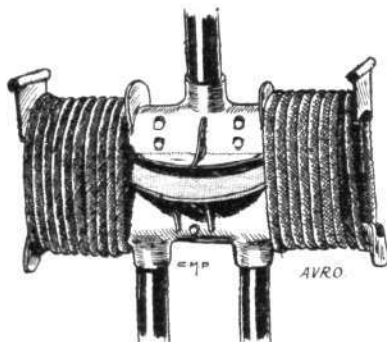
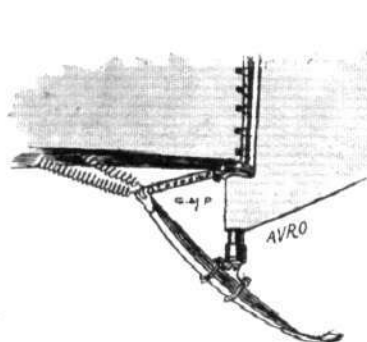
chord extra efficiency is obtained by having the upper plane placed in advance of the lower plane.

In plan the main planes are of the same shape as

Four pairs of struts of hollow spruce connect the main planes, whilst another two pairs of ash struts connect the upper plane to the fuselage. The method of attaching the lower plane to the fuselage is shown in one of the accompanying sketches. It will be noticed, that a steel lug bolted to the lower longeron has two bolts passing through the plane, but *not* through the spar inside the inner end rib. Thus the spar is not weakened by piercing, and the wing is prevented from slipping out of the socket partly by the bolts passing inside the rib, and partly by the diagonal wing-bracing cables. Another of our sketches shows the method of joining the inter-plane struts to the main spars in a similar way. It is by close attention to details like these that it has been possible to construct a machine which combines light weight with a high factor of safety. It is really the keynote of the new Avro design that the weight has been cut down to a minimum without undue sacrifice of strength.

The fuselage, which is of rectangular section, is built up of longerons of ash channelled out between the strut attachments for lightness and strengthened by flanges of three-ply wood against bending stresses. The struts and cross-members are of spruce, and diagonal cross-wiring completes the construction of the fuselage.

The pilot's and passenger's seats are arranged tandem fashion, the pilot occupying the rear seat, from where he has an excellent view in all directions, and, owing to the small width of the fuselage—2 ft. 6 ins. to be exact—he is able to survey the country below without the



The tail skid, one of the shock absorbers, and an aileron hinge on the Avro biplane.

those of the 50 h.p. non-staggered type, but in section they are naturally of a much smaller camber and angle of incidence.

necessity of leaning out over the side. From the passenger's seat an equally excellent view is obtained, and the wind-shield enables him to make his observations

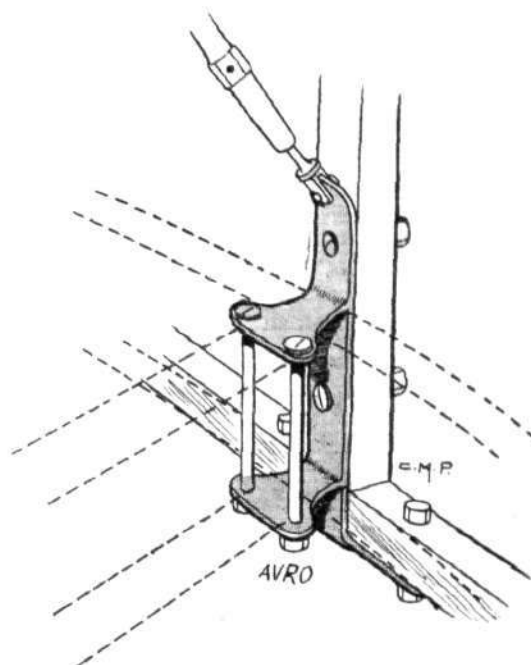
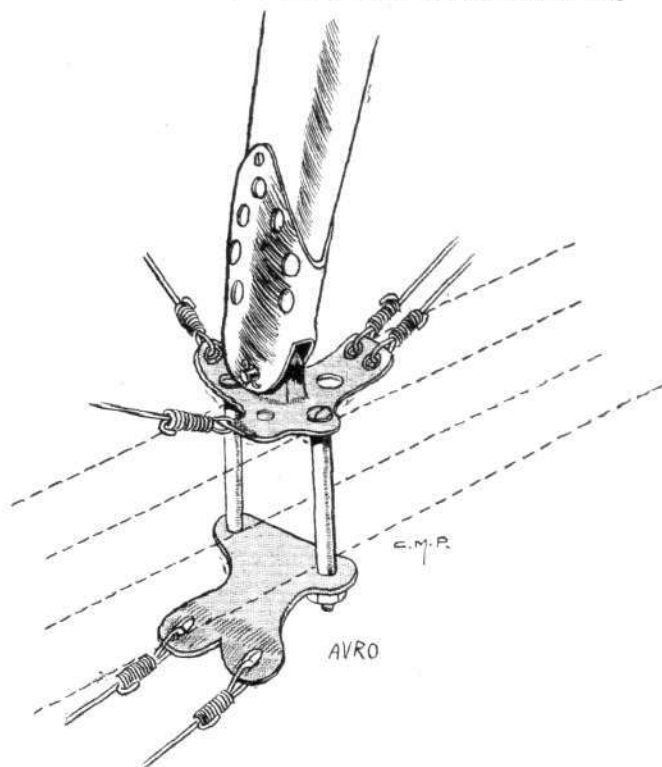


THE 80 H.P. AVRO BIPLANE.—Side view.

"Flight" Copyright

in comfort, protected as he is against the flow of air. The controls are of the usual Avro type and consist of a vertical lever pivoted on a longitudinal rocking shaft. A to-and-fro movement operates the elevator, whilst the ailerons are actuated by a side-to-side movement of the

bearings, the front one of which is formed by four tubular extensions of the *longerons* which converge until they meet on a channel steel ring which carries the front ball-bearing. A small inspection door on each side of the engine housing permits of a general examination of the



Attachment of inter-plane struts to spar on the Avro biplane, and on the right attachment of lower plane to fuselage.

hand lever. A foot-bar operates the rudder through double control wires. In this particular machine dual control is not fitted, but could easily be introduced by lengthening the longitudinal rocking shaft.

At the rear the *fuselage* terminates in a vertical knife's edge to which is hinged the rudder, which is of the usual Avro type; as are also the tail plane and elevators. A swivelling tail skid of the laminated steel spring type protects the tail planes against contact with the ground.

In the front portion of the *fuselage* and enclosed by one of the neatest aluminium shields we have seen is the engine—an 80 h.p. Gnome—which is carried in double

magneto, carburettor, oil pump, &c., whilst for close inspection the whole engine housing can be removed by undoing the butterfly fasteners by means of which the cowl is attached to the *fuselage*.

The planes as well as the *fuselage* are covered with a fabric, which has squares of stronger threads woven into it, so that should the fabric become pierced by a bullet or through any cause, these squares will prevent the fabric from tearing.

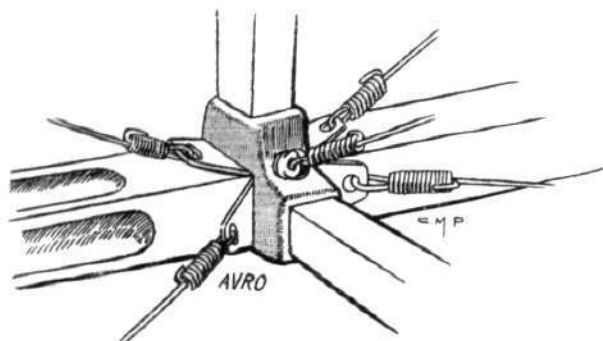
One of our sketches illustrates the very neat *aileron* hinge employed. In order to prevent the air from escaping through the opening between the rear spar and



THE 80 H.P. AVRO BIPLANE.—Three-quarter view from behind.

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the *aileron* a strip of wood of triangular section is screwed on to the leading edge of the *aileron*. The edge of this strip of wood is held tight against the rear spar by means of coil springs on the part of the hinge which is attached to the rear spar, thus making a practically air-tight joint



A fuselage joint on the Avro biplane.

at any angle of the *aileron*, without causing any undue friction which might otherwise interfere with the free movement of the lateral control.

The chassis, it will be noticed, has been slightly altered. Two pairs of V struts of streamlined steel tubes carry on their lower extremities a stout ash skid.

Instead of the laminated steel spring axle is fitted a tubular axle which is not connected to the skid, and which carries on its ends the two disc wheels. Two steel tubes run from each end of the axle to a cross-piece, whilst another single tube, pivoted to the lower *longeron* and passing through the cross-piece of the lower tubes, carries another cross-piece on its lower extremity. Rubber shock absorbers connect the two cross-pieces, thus effecting the springing of the wheels. A neat streamline casing, open at the bottom, encloses the shock absorbers and protects them against oil thrown out from the engine. By sliding the casing up along the tube until the shock absorbers are uncovered, these may readily be adjusted and examined or, if need be, replaced. Stout stranded cables running from the lower ends of the skid struts to the top and bottom of the first pair of inter-plane struts, brace the wings very effectively against drift. During the official tests at Farnborough recently, we understand, the machine, with pilot, passenger and four hours' fuel, climbed 1,000 ft. in 1.75 mins. Her maximum speed was 80 m.p.h. and her minimum speed 43 m.p.h., thus giving a speed range of nearly 50 per cent.

The weight of the machine with fuel for three hours and a passenger is 1,550 lbs., giving a loading of about 4½ lbs. per square foot.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

The Late Capt. G. Wildman-Lushington, R.M.A.

THE sad news of the fatal accident to Capt. G. Wildman-Lushington was received at the Club with great sorrow. Capt. Wildman-Lushington had been a Member of the Club for many years, and was amongst the first four officers selected by the Admiralty to take a course in aviation at the Club's Flying Grounds at Eastchurch on the aeroplanes placed at the disposal of the Admiralty by Mr. Frank McClean. Owing to illness, Capt. Wildman-Lushington had to withdraw, and his place was taken by Major E. L. Gerrard. Capt. Wildman-Lushington was a great favourite wherever he went, and his loss will be universally felt.

Royal Aero Club of the United Kingdom.

CERTIFICATE OF PERFORMANCE No. 2.

(Under the Competition Rules of the Royal Aero Club.)

THIS IS TO CERTIFY that the Dirigible "ASTRA TORRES" No. 4030 was entered by the SOCIÉTÉ ASTRA, 13, rue Couchot, Billancourt, Seine, France, for a speed trial.

PARTICULARS OF AIRCRAFT:—

CAPACITY	6,500 cubic metres
LENGTH	75 metres
DIAMETER	21 metres
MOTORS	Two Chenu, 210 h.p. each

DESCRIPTION OF TRIAL.—The trial took place on Monday, the 15th September, 1913, at Farnborough, Hants, and the maximum speed of the airship through the air, as measured by the Pitot Tube, was 51.1 miles per hour.

(Signed) H. C. L. HOLDEN, V. Chairman.

(Signed) HAROLD E. PERRIN, Secretary.

28th October, 1913. 166, Piccadilly, London, W.

Royal Aero Club of the United Kingdom.

CERTIFICATE OF PERFORMANCE No. 3.

(Under the Competition Rules of the Royal Aero Club.)

THIS IS TO CERTIFY that on the 2nd October, 1913, a GRAHAME-WHITE BIPLANE was entered for trial by the GRAHAME-WHITE AVIATION COMPANY, LIMITED, London Aerodrome, Hendon, London, N.W., the object of the trial being to create a duration record for passenger carrying.

PARTICULARS OF AIRCRAFT:—

TYPE	Grahame-White Biplane
OVERALL SPAN	62 feet 3 inches
TOTAL LIFTING SURFACE	925 square feet
MOTOR	120 h.p. Austrian-Daimler

DESCRIPTION OF THE TRIAL.—The trial took place at the London Aerodrome, Hendon, N.W., on Thursday, the 2nd October, 1913, when Louis Noel, the pilot, accompanied by nine passengers, remained in the air 19 minutes, 47 seconds.

Total weight of Pilot and Nine Passengers, 98 st. 9 lbs. 8 ozs. = 1381½ lbs.

(Signed) H. C. L. HOLDEN, V. Chairman.

(Signed) HAROLD E. PERRIN, Secretary.

28th October, 1913. 166, Piccadilly, London, W.

This flight has since been accepted as a World's Record by the Fédération Aéronautique Internationale for duration for pilot and nine passengers.

British Empire Michelin Competition No. 2, £800.

The date for this Competition expired on Sunday last, November 30th, 1913, and at that date the cross-country flight had not been accomplished. The Club is now approaching the Michelin Tyre Co. with a view to the prize being offered again for next year.

166, Piccadilly, W.

HAROLD E. PERRIN, Secretary.

The Britannia Airship Fund.

THE inaugural public meeting of the Britannia Airship Committee was held at the Hotel Cecil on Monday last, at which it was announced that an appeal would be made to the public for subscriptions, which would be devoted to building and equipping a dirigible embodying the subject-matter of various patents taken out by Mr. John Wulffing. The essential feature of the Wulffing patents is in the construction of the gasholder, by means of which it is claimed extreme lightness, and hence great lifting power, are secured. The framework of the gasbag is composed of a number of steel tubes,

passing from end to end of the balloon, and which are bent so as to give the desired shape to the hull. These tubes are fitted at their ends to end plates, through the centre of which bolts are passed, attached to a steel cable suspended in the interior. Thus, when the gasbag is inflated and the bolts are screwed up, the framework becomes quite rigid.

A letter from the Board of Admiralty was read by the chairman (Sir Norman Pringle, Bart.), intimating that they would be pleased to accept the airship on its completion, and on passing through satisfactory trials, "to show that it possessed actual naval value."

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.

GLORIOUS weather favoured the visit of the First Lord of the Admiralty and party to the aerodrome on Saturday. The cosmopolitan escadrille of machines drawn up in a long line, and numbering about a score, made a brave and inspiring sight. The aircraft on view included types of Maurice Farman, Henry Farman, Shorts, Avro, Sopwith, Bristol, Blériot and Deperdussin.

The rebuilt 100 h.p. tractor Short was on view, with the planes folded back against the fuselage. This is a very efficient machine, and Commander Samson has been flying it in fine style during the week.

The new Dunne biplane and Mr. Ogilvie's Wright made flights during the inspection, and Mr. Churchill was deeply interested in these two machines, asking several questions concerning them of Commander Samson, who accompanied him.

The First Lord arrived at noon, and at once proceeded to inspect the assembled machines. After this several of his party were taken up for flights, in different types of machines, by Commander Samson, Assistant Paymaster Finch Noyes and Capt. Lushington. Mr. Churchill had two long instructional flights with Capt. Lushington on the school Short No. 2 machine, which is fitted with dual controls, and while he was still up Mr. N. S. Percival on the Dunne went up and made a nice flight, including two complete circuits uncontrolled in any way, the machine behaving splendidly. Mr. Percival also took up a passenger during the afternoon. Prof. Huntington did several nice flights during the day, and flew quite a distance on several occasions with "hands off."

The past week has been ideal generally for flying, and due advantage has been taken of the favourable circumstances. On Monday Sub-Lieut. Young on Short 65 reached a height of 10,500 ft., and at times he was lost to view among the clouds. On an earlier attempt in the morning, his carburettor froze at 5,000 ft., and the pilot made a good gliding descent. Lieut. Clarke Hall put up a good flight on Maurice Farman 70 during the morning. With Sub-Lieut. Marix in the pilot's seat, and Lieut. Clarke Hall in charge of the gun, the Short made a good flight.

Tuesday was a nice day, and Sub-Lieut. Marix reached over 9,000 ft. on a Deperdussin, and during the afternoon he also flew the Caudron well. Eng.-Lieut. Briggs was flying his Blériot 39 in his usual fine style.

Wednesday was dull with little wind, and Com. Samson, accompanied by Eng.-Lieut. Briggs, did a good flight on the 100 h.p. Short tractor. Sub-Lieut. Rainey, on Short 63, and Capt. Courtney, on Sopwith 27, were both flying extremely well.

Instructional work on Shorts and Maurice Farman machines was carried out during the day.

Thursday, in the morning, a lot of practice and instructional work was put in, and some of the flights were very fine, notably that of Telegraphist Stirling on the Bristol, who by his exhibition showed great promise of the making of a good pilot. Mention must also be made of the flights of P.O. Telegraphist Hooper, P.O. Andrews, Ldg. Snn. Bateman, E.R.A. Badley and Pte. Edmunds.

Mr. F. K. McClean was out in the afternoon on his machine, accompanied by a passenger.

Commander Samson doing "stunts" on the Short No. 3, was the feature of the flying on Friday, and his command over the machine was wonderful.

To summarise, the following Service machines have been in use during the week:—Henry Farman 31; Maurice Farmans 23 and 70; Shorts 34, 62, 63, 64, 65; the Short gun machine, and the 100 h.p. tractor; Avro 16, 41; Caudron 45; Bristol 24; Sopwiths 27 and 33; Deperdussins 7 and 36; Blériot 39.

The pilots include Commander Samson, Lieut. Davies, Asst.-Pmstr. Finch Noyes, Lieut. Clarke Hall, Sub-Lieuts. Rainey, Young, Littleton and Marix, Capt. Courtney and Lushington, and the non-commissioned pilots Andrews, Shaw, Bateman, Hooper, Stirling, Badley, Lee and Edmunds.

Brooklands Aerodrome.

The past week at Brooklands has been one of the busiest and most eventful for some considerable time, no less than three different machines making their appearance, the 100 h.p. Gnome-engined Vickers gun-carrying propeller biplane; the 80 h.p. Sopwith "Baby" tractor biplane, and the all-steel 100 h.p. Mercedes-engined D.F.W. tractor biplane, all of which flew extremely well.

On Monday, Mr. Boger was flying his Parsons biplane. Mr. Hawker flew to Farnborough on the 80 h.p. Sopwith tractor biplane, carrying Messrs. Blatherwick and Simms as passengers. Mr. Raynham was flying well on the 80 h.p. Avro.

Lieut. Joubert de la Ferte arrived from Netheravon, on Tuesday, via Woolwich, on the two-seater Blériot monoplane, and returned to Netheravon after a short stay.

On Wednesday, the new 100 h.p. Gnome-engined gun-carrying

Vickers biplane was out for the first time with Mr. Barnwell as pilot and flying well. The 100 h.p. D.F.W. biplane arrived.

On Thursday, Lieut. McDonald passed his *brevet* tests on a Bristol biplane. Mr. Hawker's 80 h.p. "Baby" tractor biplane arrived, and after taking about an hour and a half to assemble was flying round the track at about 90 m.p.h. This machine Mr. Hawker is taking to Australia with him shortly. Mr. Pixton flew to Farnborough with two mechanics on the 80 h.p. Sopwith biplane, and afterwards returned to Brooklands. Mr. Hawker made an attempt on the Michelin Prize, leaving Brooklands at 10.20 a.m., but owing to his running into fog banks between Croydon and Eastchurch and being unable to see his way, he returned to Brooklands at 11.15 a.m. Mr. Manton on the Grahame-White gun-carrying biplane called at Brooklands after his tests at Farnborough, and stopped for the night.

On Saturday the D.F.W. biplane, which has been brought to this country by Mr. E. Cecil Kny, the manager of the German Aircraft Works, and which will be piloted at Brooklands by the well-known German airman Herr Roempler, made its first test flight, and flew extremely well, notwithstanding a shortage of 200 revs., caused by an unsuitable propeller, and seemed to be very steady and well balanced. The machine is an all-steel standard model No. 1 type, with the passenger seat immediately in front of the pilot, and will carry a load of 1,000 lbs., in addition to the passenger, whilst its petrol-carrying capacity is 50 gallons. The interior fittings are strikingly luxurious, not the least important of which are the seats, which are miniature club arm chairs, well padded. Mr. Hawker flew to Hendon on his "Baby" tractor biplane, where he was timed to reach a speed of slightly over 94 miles an hour, with a minimum of 36 m.p.h. The Vickers gun-carrying biplane was flying well, whilst the Vickers school biplanes were also busy, as were the Bristol biplanes. Mr. Pixton was out on the 80 h.p. Sopwith, flying well, as too were Mr. Raynham on the Avro biplane, and Mr. Dukinfield Jones on the Flanders biplane. Lieut. Broadhurst passed his *brevet* tests on a Bristol biplane.

On Sunday each of the three new machines had its crowd of admirers. Mr. Hawker returned from Hendon on his "Baby" tractor biplane. Mr. Barnwell made a number of good flights on the Vickers gun-carrying biplane. Mr. Raynham started for Manchester on the 80 h.p. tractor biplane. Mr. Dukinfield Jones was flying well on the Flanders biplane, as was Mr. Pixton on the Sopwith biplane. The winner of the ballot for the free passenger flight—Miss Garnett, of Newby, Sunninghill—was taken up by Mr. Merriam on the Bristol biplane. Herr Roempler made another test flight on the D.F.W. biplane, the machine flying very well.

Avro School.—Monday, last week, Raynham for short solo in morning. In the afternoon to Farnborough with passenger for official tests. The 1,000 ft. was climbed in 1½ mins. with passenger and 3 hours' fuel. In the speed tests the machine accomplished a high speed of 80 m.p.h., and flew as slow as 43 m.p.h. The rolling over



Capt. MacDonell, D.S.O., who passed for his *brevet* on the Vickers biplane at Brooklands last week.

rough ground was done with the greatest ease. After tests the return journey to Brooklands was made.

Tuesday, Raynham for several flights on 80 machine, both solo and with passengers. During one of these he visited a balloon several miles to the south, and after a few turns round it, came back at a great height.

Raynham for several short cross-country flights Wednesday morning and evening.

Thursday, in the afternoon, Raynham flew to Hendon with a passenger, returning in the evening at 5,000 ft., although only six cylinders were firing.

Saturday, for short trial on 80 h.p. machine in late evening, and Sunday, in the morning, Raynham started for Manchester with a passenger in spite of wind and rain. After flying for 2½ hours against the wind a landing had to be made five miles out of Leek, Staffs., for more petrol. This was only to be obtained after walking many miles across fields, and by the time it finally reached the machine, fog, rain and darkness prevented another start being made.

Bristol School.—Merriam testing on Monday last week, afterwards Lieut. Bridson doing fine figures of eight and good landings. Lieut. Macdonald figures of eight, twice flying high. Merriam behind Lieut. Parker and Mr. Jaques on several straights and circuits and testing machine. Then Mr. Macdonnell made a solo in usual good style. Darkness stopped further flying.

On Tuesday, Merriam test, Lieut. Macdonald and Mr. Macdonnell were up twice on straights practising landings in a wind. Merriam up behind Capt. Parker quite a long time on straights. Wind stopped further flying.

Merriam testing on Wednesday twice before pupils arrived. Lieuts. Bridson and Macdonald on figures of eight. Merriam behind Capt. Parker on several straights and circuits. Rain afterwards. After breakfast rain stopped, and Merriam testing, taking Capt. Parker as passenger. Afterwards Mr. Finny doing circuits. Then Lieut. Macdonald away for his ticket on another machine (after Merriam testing same), taking his *brevet* in very good style. Afterwards Merriam behind Capt. Parker and Mr. Jaques on several straights and circuits. Mr. Macdonnell made a solo, but soon came down owing to the wind getting up.

Merriam for test on Thursday, taking Capt. Parker as passenger. Lieuts. Bridson, Broadhurst and Mr. Macdonnell all doing straights. Too gusty for circuits. Merriam behind Capt. Parker and Mr. Jaques in a puffy wind on straights. Merriam finished by taking Mr. Finny to a good height.

On Friday Merriam up twice, but found too bumpy for school work. About 10 a.m. tried again, taking Mr. Jaques as passenger. Still found very bumpy. Too windy in the afternoon and evening.

Vickers School.—Monday, last week, Barnwell and Knight on biplane 21 with Messrs. Macdonell, Barton, Duff and Lee. Capt. Wood with Mr. Duff as passenger. Lieut. Barton for *brevet*. Messrs. Newton-Clare, Morgan, Chataway and Joubert de la Ferte solos on No. 5 mono. In afternoon, Barnwell and Knight with

Messrs. Dawson, Dowding, Oakeley and Duff on biplane 21. Messrs. Hinshelwood and Macdonell solos. Messrs. Elsdon and Webb on No. 5 mono.

Pilots Barnwell, Knight and Elsdon on biplanes 20 and 21 Tuesday, with pupils Dawson, Dowding, Duff and Oakeley. Capt. Macdonell and Mr. Hinshelwood for *brevets*. Messrs. Knight, Chataway, Elsdon and Morgan on No. 5 mono.

Wednesday, Barnwell and Knight on biplane with Messrs. Lee and Dowding. Lee solo straights and circuits. Barnwell testing gun-carrying biplane No. 18A. Elsdon and Webb on No. 5 mono.

Thursday, Knight, Waterfall, and Joubert de la Ferte on No. 5 mono. Lee solo on biplane 21. Barnwell testing Blériot monoplane. Knight on biplane with Messrs. Oakeley and Duff. Elsdon on No. 5 mono.

Knight on biplane 21 Friday, with Messrs. Oakeley and Duff. Barnwell testing Blériot in morning, and gun-carrying biplane in afternoon.

Elsdon, Knight and Lee, Saturday, on biplane 21, solos. Mr. Howell for *brevet*. Elsdon, Waterfall and Joubert de la Ferte solos on No. 5 monoplane. Barnwell testing No. 3 mono., and later on gun-carrying biplane with passengers.

Sunday, Barnwell on biplane No. 18A with passengers.

Eastbourne Aerodrome.

ON Tuesday afternoon of last week, Fowler was out on the 80 h.p. Farman; he was followed by Gassler on the Bristol. After this Mr. Hunt went up for the first half of his ticket. He successfully completed the five figures of eight, and was making for the mark to land when an inlet-valve stuck up, and caused him to start coming down. All would have been well had he done so, but the engine picked up again, and Mr. Hunt then attempted to come round over the sheds to reach his landing mark. When past the sheds he had to pass over a road and some houses, and flying very low the valve again stuck, and this time he could not reach the aerodrome, but pancaked on to a roof, doing considerable damage to the machine and the roof. He fortunately escaped with a bumping.

On Friday Fowler was out on the 80 h.p. Farman, after which he took Mr. Thornely for a cross-country stunt.

Saturday, Fowler and Mr. Thornely were again out across country on the 80 h.p. Farman. Gassler was out testing the new E.A.C. biplane.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Monday, last week, Messrs. Clarke, Edridge Green, Norris, F. A. Bjorkland, N. Howarth and Webb, straights with Instr. Strange in the passenger seat. Messrs. Norris, Von Segebaden straights with Instr. Manton in passenger seat. Messrs. R. J. Lillywhite and Cripps solo circuits and figures of eight.

Next day Messrs. Edridge Green, Norris, Bjorkland, Von Segebaden straights with Instructor Manton in passenger seat. Messrs. Howarth, Webb, Kershaw and Francis straights with Instructors Birchenough or Strange in passenger seat. Mr. Lillywhite solo straights and circuits. Lord Grosvenor rolling and hopping alone, afterwards making straight flights with Instructor Manton. Mr. Von Segebaden solo straights.

Thursday, Messrs. Howarth, Francis, Bjorkland, Edridge Green, Kershaw, Norris, and Webb straights with Instructor Strange in passenger seat. Messrs. Von Segebaden and Howarth solo straights and circuits. Lord Grosvenor straights and circuits.

W. H. Ewen School.—On Monday, last week, school was out at 7 a.m. M. Baumann was on *brevet* machine for test flight, after which Messrs. Badgery, Johnson and MacGregor were doing nice straight flights and small turns. Mr. F. W. Goodden made a test flight on the 35 h.p. Caudron No. 1. Lieut. Kinnear and Mr. Cooper straights on same machine. At 3.20 p.m. the pupils were again out. After test flight by Mr. Goodden on 35 h.p. Caudron No. 1. Lieut. Kinnear, Messrs. Murray, Carruthers and Cooper were doing straights. M. Baumann made a test flight on *brevet* machine, after which Messrs. Badgery, MacGregor, Johnson and Scott were doing straight flights and small turns.

On Tuesday the pupils were out at 11.3 a.m. M. Baumann made a test flight on *brevet* machine, and Messrs. MacGregor and Scott made straight flights. Mr. F. W. Goodden test flight on 35 h.p. Caudron No. 1, after which Lieut. Fraser, R.N., Lieut. Kinnear, Messrs. Murray and Wiggett did straights.

It was too windy on Wednesday for school work. At 7.20 a.m. on Thursday the school was out. M. Baumann made a test flight on *brevet* machine, after which Mr. Johnson did straights, half-circuits and circuits in excellent style, Mr. Scott doing half-circuits. After Mr. Goodden had made a test flight on the 35 h.p. Caudron No. 1, Lieut. Fraser, R.N., Lieut. Kinnear and Mr. Murray did straights, and Messrs. Cooper and Wiggett were rolling and doing short straights.

Hall School.—Monday, last week, J. L. Hall flying Caudron ten minutes. Tuesday, Caudron readjusted for pupils.



Mr. Fred G. Bevis, a pupil at the Eastbourne Aviation Company's aerodrome, who recently obtained his certificate on an E.A.C. biplane.

Wednesday, Miss Sophie d'Elsa out on Caudron with Hall in charge, rolling and straight flights.

Dr. W. C. Moriarty four straights and four circuits, J. L. Hall piloting Thursday, Miss S. d'Elsa three straights and four circuits, J. L. Hall in control. W. May one circuit as passenger. Dennis Ware flying high for quarter of an hour.

Friday, in morning, Allen one circuit as passenger with J. L. Hall. Then Miss d'Elsa and Dr. Moriarty four circuits each in passenger seat studying controls.

J. L. Hall Saturday morning tested air conditions with Mr. Meredith as passenger. Later Dr. Moriarty four straights on Caudron, and Miss d'Elsa four straights alone in machine. Then J. L. Hall a few circuits to wind up morning's work.

Salisbury Plain.

Bristol School.—Weather unfit for tuition on Monday, last week, and Wednesday morning. In afternoon Voigt made a trial, but found too windy for tuition. Later another trial and then Lieut. Marsh went for his *brevet*, which he passed successfully, maintaining his height throughout very well.

On Thursday, Voigt made a trial and then took for tuition Capt. Fell and Walcott. Jullerot also took Capt. Fell for tuition. Capt. Hay executed a solo on the biplane. Mr. Tod did short flights on the biplane and tandem monoplane, but weather became too bad for him to attempt more.

Jullerot made a trial on biplane on Friday, and afterwards took Lieut. Gilligan for tuition. No further tuition was possible on account of quickly rising wind. No flying possible on Saturday.

Jullerot made a trial flight on Monday evening, but found much too windy.

Shoreham Aerodrome.

BOTH the 35 h.p. and the 45 h.p. Green-Avros have been requisitioned a good deal during this and last week, and some progressive school work has been accomplished. Elliott has been out every day testing and putting up some fine flights at five or six hundred feet. Cannon has been doing straights nearly every day, and has now passed to the curve stage, while Lusted has accomplished many steady straights. A new pupil, Purnell, joined on Wednesday of last week, and for first time out showed good judgment. On the whole, a very satisfactory period has been reached, and two more pupils are expected next week. Lieut. Lucas has returned, and is again practising on the 35 Green.

Central Flying School.—During the week the following instructors have been at work. Capt. Webb Bowen with Mechanic Clarke 70 mins. and 50 mins., Lieut. Stodart 26 mins. and 60 mins., and Lieut. Bone 10 mins. Lieut. Shepherd with Mech. Darke 32 mins., Mech. Warren 50 mins., and Lieut. Hepper 12 mins., 33 mins., and 17 mins. Lieut. Carmichael with Mech. Warren 54 mins., Sergt. Gardner 45 mins., 40 mins., and 30 mins., Sergt. McCrae 20 mins., Mech. McDonald 10 mins., and Lieut. Empson 25 mins. Major Gerrard with Lieut. Robin Grey 10 mins., Lieut. Empson 40 mins., Lieut. Lewis 15 mins., Lieut. Breese 25 mins., 25 mins., and 20 mins., and Mech. Sharpe 40 mins., 30 mins., and 25 mins. Capt. Salmond with Lieut. Dalrymple Clark 15 mins. and 28 mins., Lieut. Mapplebeck 15 mins. and 20 mins., Lieut. Nanson 10 mins. and Capt. Griffith 45 mins. and 20 mins. Lieut. Waldron with Lieut. Nanson 7 mins., Lieut. Brock 30 mins., Mech. Power 25 mins., 40 mins., and 20 mins., and Mech. Joel 20 mins.

ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE summary of work for week ending November 29th:—

No. 1 Airship Squadron. Farnborough.—The "Delta" has been out several times during the week, carrying out instructional flights. Free balloon ascents were made for training purposes.

No. 2 Squadron. Montrose.—Several long cross-country flights were made during the week. On the 27th ult. Capt. Longcroft flew from Montrose to Farnborough, and then on to Portsmouth and back to Farnborough, a non-stop flight of 630 miles (7½ hours). The squadron has been carrying out revolver musketry training.

No. 3 Squadron. Netheravon.—There was a considerable amount of flying in the B.E. and Blériot flights throughout the week; 1,461 miles in all were covered.

No. 4 Squadron. Netheravon.—The officer and N.C.O. pilots of A, B, and C flights carried out reconnaissance flights daily; 1,051 miles in all were covered.

No. 5 Squadron. Farnborough.—The B.Es. and Maurice Farman's of this squadron were flown each day. The officers who have recently joined obtained a considerable amount of practice.

The detachment at Dover carried out reconnaissance flights over the surrounding district.

Flying Depot.—Much work was carried out in the workshops during the week. Experiments on various lines were continued.

The following passengers were carried: Lieut. Waldron, Mech. Butt, Mr. Codrington, Mr. Savory, and Mr. Dobson by Capt. Salmond; Sergt. Vagg by Lieut. Waldron; Lieut. Carmichael twice by Major Gerrard.

During the week, several cross-country flights were made: Lieut. Robin Grey to Lark Hill, Amesbury, and Bulford, taking 45 mins.; Lieut. Lewis to Everleigh and back, 40 mins.; Sergt. Wright to Netheravon and back, 25 mins., and to Andover and back, 50 mins.; Sergt. Jarvis to Amesbury and Tidworth, 40 mins.; Lieut. Bone to Andover and back, 75 mins.; Lieut. Chambers to Salisbury and back, 56 mins.; Lieut. Waldron, with Mr. Beach as passenger, to Farnborough and back, 85 mins.; Major Gerrard, with Lieut. Hepper, to Fargo Wood and back; Lieut. Cogan to Portsmouth and back.

Practice flights were made by the following officers:—Lieut. Baird, 3 hours 55 mins., in all nine flights; Lieut. Bewes, 3 hours 20 mins., eight flights; Sergt. Jarvis, 45 mins., two flights; Sergt. Wright, 45 mins., two flights; Lieut. Collett, 6 hours 10 mins., thirteen flights; Lieut. Bone, 3 hours 28 mins., eight flights; Lieut. Penn Gaskell, 2 hours 5 mins., six flights; Capt. Webb Bowen, 5 mins.; Lieut. Shepherd, 60 mins., six flights; Lieut. Robin Grey, 1 hour 5 mins., three flights; Lieut. Lewis, 57 mins., two flights; Lieut. Hoskin, 59 mins., four flights; Lieut. Williamson, 53 mins., two flights; Air-Mechanics Savill and Copper, 13 mins. and 20 mins.; Sergts. Stafford and McNamara, 15 mins. each; Capt. Kilner, 1 hr. 45 mins., four flights; Lieut. Humphreys, 25 mins.; Lieut.-Col. Cameron, 1 hour 16 mins., three flights; Lieut. Bower, 20 mins.; Master Mechanic Scott, 8 mins.; Sergt. Farrer, 12 mins.; Sergt. Porter, 18 mins.; Capt. Salmond, 30 mins., three flights; Lieut. Waldron, 1 hour 52 mins., eight flights; Engineer Lieut. Randall, 15 mins.; Capt. Griffiths, 40 mins., two flights; Lieut. Mapplebeck, 48 mins., three flights; Mech. Smith, 39 mins., two flights; Lieut. Wanklyn, 44 mins., three flights; Assistant Paymaster Lidderdale, 54 mins., three flights; Sergts. Robins and McCrae, 37 mins. and 30 mins.; Sergt.-Major Levick, 38 mins.; Master Mechanics Scott and O'Connor, 8 and 24 mins.; Mechs. Collis and Butt, 32 and 15 mins.; Chief Mechanics Case, Pack and Grady, 10, 14 and 20 mins.; Capt. Ellington, 3 hours 17 mins., twelve flights; Lieut. Stodart, 3 hours 25 mins., nine flights; Lieut. Chambers, 1 hour 44 mins., six flights; Lieut. Nanson, 2 hours 25 mins., eight flights; Lieut. Dalrymple Clark, 1 hour 30 mins., seven flights; Lieut. Brock, 2 hours 31 mins., ten flights; Sergt. Vagg, 45 mins., two flights; Mech. Dismore, 45 mins., two flights; Sergt. Patterson, 65 mins., three flights; Sergt. Gardner, 25 mins., two flights; Major Gerrard, 35 mins.; Lieut. Carmichael, 45 mins., three flights; Lieut. Mitchell, 4 hours, eight flights; Lieut. Empson, 3 hours, six flights; Lieut. Lewis, 3 hours 15 mins., six flights; Lieut. Breese, 1 hour 45 mins., five flights; Lieut. Cogan, 3 hours 10 mins., six flights.

Two *brevets* were obtained during the week, Master Mechanic Scott on a Maurice Farman, and Sergt. McCrae on a Short propeller biplane. Sergt. Mitchell flew for *brevet*, but failed at the landings.

On Tuesday, Lieut. Conran, with Lieut. Stopford as passenger, arrived from Netheravon on Blériot No. 292, returning later in the day.

The machines in use during the week were: Avros, Nos. 406, 430, 432, 433, and 448; Maurice Farman's, Nos. 403, 415, 425, 427, 428, 450, 451, and 458; BEs, Nos. 417, 438, 441, 447, 453, 454, and 457; Henry Farman's, Nos. 440, 445, 455, and 456; Short propeller biplanes, Nos. 401 and 402.

The Paris to Berlin Airway.

APART from the work of the Association Générale Aéronautique, who it is understood are proposing to mark out the landing places, starting with those on the Paris Bordeaux route at Tours, Poitiers, Angoulême, and Bordeaux, it is understood that the French military authorities intend to mark a route from Paris to Nancy. Should this prove successful, the German Government may continue the marking to Berlin. Experiments have been carried out at Villacoublay with signs visible at a distance of 2½ miles from an altitude of 3,000 ft. It is hoped that by the adoption of some such marking of various routes aviators may be able to avoid passing over forbidden zones.

The Work of the "Victoria-Louise."

SOME interesting figures regarding the work of the Zeppelin liner "Victoria-Louise" have recently been published by her owners, the Delag Co. On March 4th, 1912, she cruised from Friedrichshafen to Frankfurt, and between that time and June 23rd, 1912, she made 100 trips. Another hundred voyages were made during the ensuing four months, while up to July 30th last the number was 300, and on November 26th the record was 400 trips, during which the airship had covered 47,364 kiloms., being in the air for 852 hours. She carried during that time 8,551 passengers, and used 84,323 litres of petrol, 432,756 cubic metres of hydrogen, and 8,782 kilogs. of oil.

BRITISH NOTES OF THE WEEK.

THE ROYAL FLYING CORPS.

The following appointments were announced by the Admiralty on the 26th ult. :—

Lieut. R. B. Davies to the "Hermes," additional, for staff of Naval Flying School, as Squadron Commander, to date Nov. 25th.

Engineer-Lieut. E. T. Briggs, to the "Hermes," additional, as Squadron Commander, for Naval Flying School, for charge of machinery, to date November 25th.

Acting Capt. I. V. Courtney, R.M.L.I., to the "Hermes," for staff of Naval Flying School, as Squadron Commander, to date November 24th.

The following appointments were announced by the Admiralty on the 29th ult. :—

Lieut. H. D. Vernon, to the "Hermes," additional, for Naval Flying School, Eastchurch, to date November 28th.

Capt. A. C. Barnby, R.M.A., to the "Hermes," additional, for Fifth of Firth Air Station, to date November 28th.

The following appointment was announced in the *London Gazette* of the 2nd inst. :—

R.F.C.—Military Wing.—*Special Reserve of Officers.*—Maurice Bernal Blake to be Second Lieut. (on probation). Dated Dec. 3rd.

Mr. Churchill at Eastchurch.

ON Saturday the Royal Aero Club flying grounds at Eastchurch were visited by the First Lord of the Admiralty, who was accompanied by Commodore Lambert, Capt. M. Sueter, D.A.D., and Lt.-Col. Sykes (Commandant of the Military Wing, R.F.C.).

All the machines of the Naval Wing at Eastchurch were paraded and inspected by the First Lord, who afterwards went for two separate flights as passenger. He then lunched at the Naval Mess, and in the afternoon made a third flight of nearly an hour's duration, during most of which time it is understood Mr. Churchill personally took control of the machine.

An interested spectator of the day's doings was Sir Percy Girouard—one of the directors of the Armstrong Whitworth Co.—and it is significant, in face of the recent announcement that this great firm are beginning to engage actively in the aeronautical industry, that Sir Percy was taken for a long flight by Lieut. Davies, R.N., in a Sopwith tractor biplane.

The Disaster at Eastchurch.

BY the fatal accident which cost the life of Capt. G. V. Wildman-Lushington, R.M.A., at Eastchurch on Tuesday, the Naval Wing of the Royal Flying Corps has lost one of its ablest officers. He was returning from a flight to Sheerness with Capt. Fawcett, R.M., and had very nearly reached his destination when the machine side-slipped. Dropping on to one wing tip in the Royal Aero Club's ground the biplane overturned and the pilot was crushed beneath the petrol tank, receiving fatal injuries. The passenger fortunately escaped with a broken collar bone. Capt. Wildman-Lushington was appointed a flying officer at Eastchurch on December 5th last year and was promoted to Flight Commander last April. It may be recalled that he was one of the original quartette of Naval officers to receive instruction in flying at the hands of Mr. G. B. Cockburn on the machines lent by Mr. F. K. McClean, but owing to illness his place had to be taken by Major Gerrard.

At the inquest on Wednesday, the jury returned a verdict of "Accidental Death," due to the machine side-slipping.

The Station at Montrose.

THE new military aircraft station at Montrose is to be equipped with three hangars, each 210 ft. long by 65 ft. broad and capable of accommodating five biplanes. The sheds will be of corrugated iron with wooden framework and asbestos lining, while the floor will be of concrete. It is understood that this is the beginning of a large scheme in view of the probable increase in the number of aeroplanes to be stationed at Montrose.

The Olympia Aero Show.

JUDGING from the inquiries received by the Society of Motor Manufacturers and Traders, Ltd., there still appears to be a doubt as to whether the Aero, Marine and Stationary Engine Exhibition will be held in March. We are, therefore, requested to state that without doubt this exhibition will be held at Olympia in that month, and already preparations are being made to ensure it being a great success.

R.Ae. C. Trials.

AMONG the official notices of the Royal Aero Club, on p. 1326, will be noticed two certificates, one relating to a speed trial of the Astra-Torres airship, and the other to the nine passenger world's record of the Grahame-White "char-a-bancs."

Testing the H.P. Biplane.

DURING last week the new 100 h.p. Handley Page biplane underwent its hour's test flight with a passenger preparatory to being handed over to the purchasers. With Mr. W. Rowland Ding as passenger and Mr. Whitehouse as pilot, the machine flew over Hendon for the necessary period, climbing well and flying steadily in the wind.

Messrs. Bainbridge and Meredith also went up as passengers. On Sunday one of the members of the Northampton Polytechnic Engineering Society had a flight, as also did Lieut. Fenwick, of the Royal Horse Guards.

The Scottish Aeronautical Society.

A MOST excellent programme of lectures has been arranged for the winter session by the Scottish Aeronautical Society. On Wednesday of last week Brig.-Gen. F. G. Stone gave a paper on Aerial Bombardment, while the subjects to be discussed at future meetings include December 10th, "Aero Engine," by Mr. Granville E. Bradshaw; January 21st, "Military Aviation," by Lieut. R. Barry Mar, R.F.C.; January 28th, "New Gyroscopes and their Application," by Dr. James G. Gray; February 11th, "Aerial Reconnaissance," by Capt. W. A. de C. King, R.E.; February 25th, "Flying Machines, Balloons, and Airships," by Miss Gertrude Bacon; March 4th, "Hydro-Aeroplanes," by Lieut. A. M. Longmore, R.N.; March 18th, "The Use of Models in the Development of the Aeroplane," by Mr. V. E. Johnson. With the exception of the lecture on Gyroscopes, which will be held at Glasgow University, the meetings will be held at the Institution of Engineers and Shipbuilders in Scotland, Elmbank Crescent, Glasgow.

Lewes and After.

ON Friday of last week Mr. Cecil Pashley started from Shoreham for Lewes just before luncheon, and arrived at his destination after a somewhat bumpy journey. An exhibition was given from the Race Hill, and many passengers were carried. Making the return journey in the oncoming darkness, Mr. Pashley lost his way between two rows of hills. It was almost dark, and a landing was inevitable. The machine remained in a ploughed field during the night, and returned to Shoreham the following morning, after a very difficult ascent. Mr. Eric Pashley has been out again doing "stunts" at Shoreham, his flying having lost none of its neatness during his recent enforced rest.

Guns for Fighting Aircraft.

SOME excitement was caused in the Isle of Wight last week by the report that some wreckage looking very like a damaged aeroplane had been seen floating off the Needles. It subsequently transpired that it was the remnants of kite targets which had been used in testing the new aerial guns at the Needles Battery.

A Lecture at Highgate.

ON the 1st inst. Mr. G. W. Pedstley lectured before the Highgate Village Society in the New Hall on the subject of "Aviation." After a brief review of the early days of flying and the most noteworthy events, the lecturer went on to deal with the more technical aspect of aviation. A comprehensive selection of lantern slides were shown, and means of control and manipulation were lucidly explained by means of models, as well as by interesting series of paper glider experiments. A vote of thanks to the lecturer was proposed by Mr. M. B. Ross, who also made some interesting references to aviation.

A Cellon Mem.

BY an oversight an old advertisement referring to Cellon was included in our last issue instead of a reference to the new company of Cellon, Ltd., Stirling Chemical Works, Canning Road, Stratford, E.

Presents for Christmas.

ONCE again we are reminded that the festival of presents is at hand by the arrival of the catalogue of Gamage's Christmas Bazaar, and, after glancing through it, we can only say that apparently the easiest way to solve the question of what to give is to visit Gamage's in Holborn. Presents, useful and ornamental, to suit all ages and all sorts and conditions of men and women and the younger generation simply crowd the pages of the catalogue, which is adorned with a bright and clever front cover from the brush of Lawson Wood.

Brighton Waterplane Station Closed.

WE understand from Messrs. Magnus Volk, Ltd., that they have now dismantled for the winter their temporary waterplane station at Brighton which has been so successful during the past season. It is hoped that by spring there will be a permanent waterplane station available.

ARMCHAIR REFLECTIONS.

By THE DREAMER.

Play the Game!

I COULD hardly believe my eyes on Tuesday morning when I read in *The Daily Mirror* that somebody had been tampering with Temple's aeroplane. I thought at least on this occasion I must be dreaming in reality. As however, it is given as a fact, I cannot but believe that it is true, and I am very sorry to have to admit, at least *pro tem.*, that such a thing could take place in England.

I saw Temple flying on Saturday last, and saw him make what appeared to me a rather hurried descent well out in the aerodrome, but I did not think that it was anything in particular. I was wrong, according to the following cutting from *The Daily Mirror*:—

AEROPLANE MYSTERY.

MR. TEMPLE FINDS HIS MACHINE HAS BEEN TAMPERED WITH.

As the result of what is believed to be a deliberate tampering with Mr. George Temple's monoplane, a strict guard is being placed over the aeroplanes at the Hendon Aerodrome.

These are the facts obtained by *The Daily Mirror* yesterday of the alleged tampering with Mr. Temple's machine.

On Saturday last the young airman was flying over the aerodrome, when there was a loud report in the engine, and he had to make a rapid descent.

He returned to his sheds, and there, in the presence of eight witnesses, an examination was made of the inlet valve of the 50 h.p. Gnome engine.

In one of them a small copper rivet, about $\frac{1}{4}$ in. in length, which, it is stated, could not have been introduced into the engine accidentally.

Yesterday, Mr. Temple was flying when the engine developed the same trouble as on Saturday, and subsequently another copper rivet was found in one of the cylinders.

Later in the evening, Mr. Temple dismantled his machine and found, in addition to the rivet, a quantity of emery powder in the engine—a most dangerous substance.

Two anonymous letters have been received by Mr. Temple.

One of the letters, written on Royal Aero Club notepaper, received by Mr. Temple on November 25, was as follows:—

"Unless you want to be 'hot stuffed' on Thursday it would be advisable to take your 'bus to Brooklands on Wednesday and return to Hendon on Thursday afternoon as I hear attempts will be made to stop you flying on Thursday."

It seems to me impossible that these rivets could have got into the engine by accident, therefore the only conclusion one can come to is that they were deliberately placed there by someone for the express purpose of

disabling the machine when in the air, and that the person, whoever it may be, recked nothing of the risk to Temple himself, which word risk is a mild one in the extreme and might easily be changed to worse.

Unfortunately this is not the first time that something of this kind has happened at Hendon. Late last year there was consternation in the Dep. sheds owing to the fact that somebody put a nut or bolt in the crankcase of Lieut. Porte's machine, with the result that the engine was wrecked absolutely, hardly a piece of it being left, and Mr. Porte himself and a distinguished naval officer who was his passenger narrowly escaped with their lives, owing to the fact that they were flying outside the aerodrome at the time, and only just managed to get back.

I myself, cannot conceive a fellow creature so vile as to deliberately and wantonly, by an action from which there was so little to gain, jeopardize the life of another, yet, if this report be true, somewhere in our midst there lives one whom to call a dog would be a ghastly insult to the canine specie.

Man for his own protection, for the protection of that life which we all hold so dear, and which none have a right to terminate, either in themselves or in others, is provided with a power not accorded to the lower animals; that power of superiority of brain, whereby he may be able to protect himself from sheer brute force displayed by them. I can think of no creature, however far down the scale of brute creation I may look, who will take the life of one of his own kind simply to destroy that life, and without personal gain.

I cannot for the life of me think that this thing has been done to Temple from jealousy. Surely aviation has not descended to such a low level that jealousy of a brother aviator should incite one to attempt life. Apart entirely from that, I should think Temple of all men should not be one to arouse any ill-feeling. He is young and needs experience in the art that he has chosen to take up, but he is one whom, personally, none could help but like.

It can only be the work of a criminal lunatic—may he be speedily identified and put safely beyond the power of repeating his dastardly crime.



More Looping the Loop.

ON the 25th ult., at Villacoublay, Garros on his Morane-Saulnier succeeded in looping the loop when accompanied by Tabuteau in the passenger seat.

On Saturday and Sunday, Hanouille was looping the loop on his Blériot at Buc, preparatory to commencing a tour. Undeterred by the fact that on Sunday afternoon, on account of the mist, it was impossible for the spectators to see very high, Hanouille went up and made some loops within about fifty metres of the ground.

Continuing his tour of Europe, Pegoud on Saturday and Sunday gave exhibition flights at Bucharest, his flights on the first day being watched by King Charles and Prince Carol.

While making an upside down flight at Antwerp on Saturday, Chevilliard had his motor stop, apparently through the petrol supply failing. He was unable to right the machine, which crashed into some iron wire and fell a short distance to the ground. Chevilliard was thrown out, but fortunately escaped with a few bruises, and borrowing another machine he was able to give some exhibition flights on the following day.

On Sunday Chanteloup gave a very fine exhibition on his Caudron biplane at Amsterdam, before a crowd estimated at between 80,000 and 100,000 persons. In his first flight he made an "S," followed by three loops and a fine spiral descent. Subsequently he made a circuit of the ground with his machine upside down, then described a "Z," and finished up with a cork-screw spiral.

A German Passenger Height Record.

AT Johannisthal, on the 27th ult., Max Schuler, accompanied by Lieut. Libmann, on an Ago biplane fitted with a 6-cyl. 120 h.p. Argus motor, beat the German passenger height record by going up to 3,400 metres. The old record was 3,270 metres, held by Lieut. Canter.

Helen's Record for the Michelin Cup.

SATURDAY saw the conclusion of Helen's wonderful essay for the International Michelin Cup, when he beat Fourny's record of 15,989.2 kiloms. by 107.4 kiloms. Each day last week he added 533 kiloms. to his aggregate with an extra round on Friday, so that when he finished on Saturday afternoon, the total as officially recorded was 16,096.6 kiloms. flown during 30 consecutive days over the course from Etampes to Cercottes and back. Counting the flying on the previous nine days, of which Helen lost the credit through having to stop before reaching the official timekeeper, he had covered 20,787 kiloms. in 39 consecutive days. He had intended going on until the end of the year, but in view of the bad weather conditions prevailing on Sunday it was decided to stop, and on Monday the machine was packed up and returned to Paris. Anyway, Helen's record can hardly be beaten as the contest closes December 31st. It should be mentioned that Helen's machine is a Nieuport monoplane fitted with 80 h.p. Gnome motor, and Chauviere Integral propeller.

THE LEWIS AIR-COOLED MACHINE GUN.

THE recent demonstration arranged by the Birmingham Small Arms Co., Ltd., at Bisley, in connection with the Lewis automatic air-cooled machine gun, at which a large number of distinguished naval and military officers and others interested in aviation were present, brings again into prominence the important part that will be played by aerial craft in a war between Powers provided with aeroplanes and dirigibles.

For the armament of such craft, the machine gun has inherent advantages over other weapons, but it is essential that the gun should be specially adapted for this class of work. It is important that it should be entirely self-contained, it should have little weight, be readily dismantled and assembled and be capable of firing in any direction; and since the time of engagement will probably be short, the projectile should be as destructive in its effects as possible. For use on aeroplanes, the weight, cumbrousness and recoil of a gun capable of discharging explosive projectiles render such at a disadvantage compared with the machine which is capable of firing a large quantity of small ammunition at high speed, and hence for this form of aircraft the latter is preferable.

It is claimed that in the Lewis air-cooled machine-gun, shown in the accompanying illustration, these qualities are exemplified. Its weight is 26½ lbs., it can be handled by one man, and fired in any position or direction, its recoil is negligible and the normal rate of firing is 500 rounds per minute, but this can be increased if desired up to 800 rounds per minute, and single rounds, or bursts of any number of rounds up to the full capacity of the magazine, which is 47 rounds, may be fired if desired. The magazine, M, which takes under two minutes to load by hand and considerably less by the aid of a special machine, uses the ordinary service ammunition, and may be charged in a few seconds. The facility with which the assembling or dismantlement of the gun can be carried out is a remarkable feature of the invention, the only tool required being the nose of an ordinary bullet, and it is stated that 1,500 rounds may be fired without dangerously overheating the barrel, which is air-cooled. The system of air-cooling employed is not the least of its good

points, as thereby the necessity of carrying a supply of water for cooling purposes is entirely avoided.

On the barrel, B, is a close-fitting sheath or jacket of aluminium with radiating longitudinal fins, surrounding which is a thin tubular steel casing, C, four inches in diameter. The tubular steel casing extends beyond the muzzle of the jacketed barrel, and as the gases of explosion emerge in a conical blast behind the bullet, they act as a kind of pump plunger inside this tubular extension, and suck currents of fresh cool air through the sector-shaped longitudinal passages along the exterior of the barrel. The air ejector thus formed at each discharge is most effective in cooling the barrel and is without mechanism or moving parts. During the first few hundred rounds the temperature rises rapidly until it has reached about 330° F., then more slowly until at the end of 1,000 rounds fired at full speed it does not exceed 440° F., and under ordinary Service conditions will be much lower.

The operating mechanism on the Lewis gun embodies several unique features, but one in particular should be mentioned—the use of a spring removed from the heat of the gun barrel. The gun is gas operated, that is to say, the energy required to load the breech and fire the cartridge is obtained by trapping some of the gases of the explosion through a small hole located a few inches from the muzzle. While the bullet is passing from this orifice to the muzzle, a period of about $\frac{1}{1000}$ of a second, the gases deliver a blow to a piston, P, connected to the breech operating mechanism, and the energy thus stored as momentum in the moving mass serves to overcome the resistance represented by unlocking the breech, extracting and ejecting the cartridge case, turning the magazine and winding the spring that is subsequently to close the breech and fire the shot. This cycle of operations is repeated as many as 800 times a minute when the gun is working at its full speed, but the rapidity of fire can be regulated by changing the area of the orifice through which the gases are trapped, and by varying the tension on the clock-spring.

It is apparent that the spring element in such a system must be



Trying the new Lewis automatic gun on a Grahame-White biplane at Bisley last week. The biplane, piloted by Mr. Marcus Manton, with Lieut. Stillingwerf in the seat underneath, manipulating the gun, is just passing over the Clock Tower at Bisley before firing at the target just beyond.

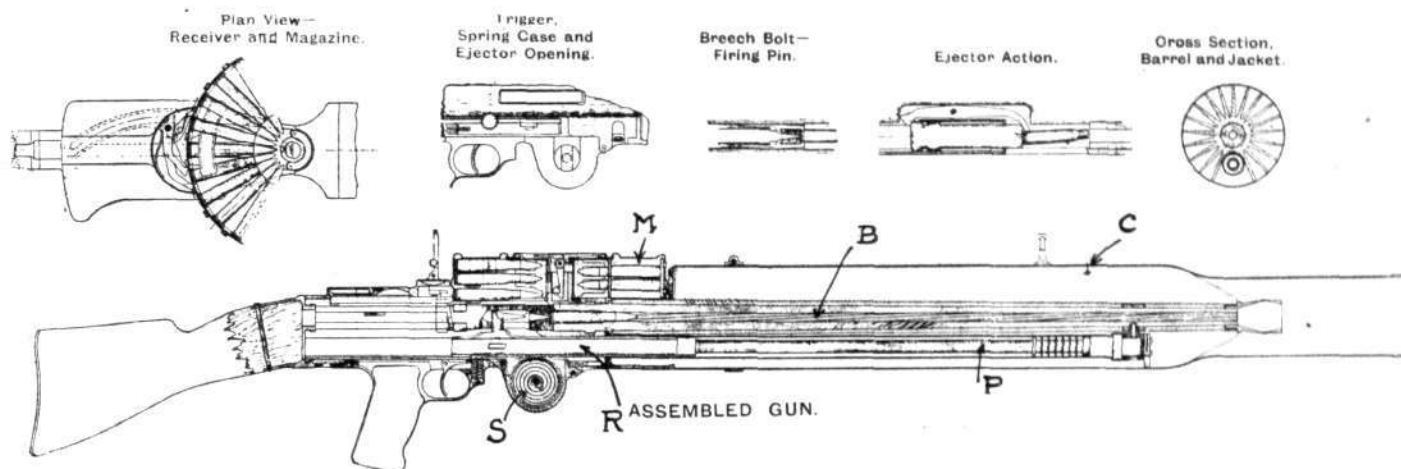
"Flight" Copyright.

kept in perfect condition to function indefinitely, and particularly must it be kept from getting even moderately hot, for spring steel is permanently affected at 270° F. A coiled spring lying along the stem of the piston is thus out of the question, and in the Lewis gun use is made of a "clock spring," S, of special and peculiar design, which is contained in a small oil- and dust-tight case of its own just in front of the trigger. The spring drum has a toothed periphery engaging with a toothed rack on the operating rod, R, and in this way the spring alternately controls and is controlled by the piston rod without being subjected to the temperature of the forward part of the rod itself.

To overcome the trouble often experienced through the jamming of the mechanism for feeding the cartridges, through derangement,

When the expanding gases emerge as a conical blast from the muzzle, they impinge with very high velocity against the inner surface of the tubular steel casing of the cooling system. For a distance of at least two inches the gases are in contact with the metal surface, and the friction thus set up is sufficient to diminish the recoil by more than one-half. In other words, the recoil of the Lewis machine gun is less than one-half that of any other machine gun of equal weight. It is, in fact, possible to fire the gun while holding it in the hands at arm's length, which is a very good test of its steadiness, and this quality, it need hardly be emphasised, is another advantage of first-class importance, particularly in respect to the use of armament on aircraft.

The tests to which the gun was subjected included firing from a



a defect to which the belt form of feed is susceptible, or by the introduction of a little dust or sand, a balanced rotary magazine of circular form is employed, by means of which the cartridges and feeding mechanism are protected, and it becomes possible to fire the gun in any position. The cartridges are arranged radially as seen in the illustration, and are retained in a permanent circumferential position by flutes pressed on the outer casing of the magazine, and by slots in the interior, but the nose of the bullet rests in a coarse threaded ring clipped to the pivot about which the magazine turns. Thus as the magazine rotates, the cartridges are forced to descend along this groove until they pass into position for firing.

The construction adopted in order to reduce the recoil is another unique feature of this gun, and operates in the following manner.

Grahame-White biplane rigged up with an emergency seat below the pilot in flight, and from the 200 and 500 yards ranges at stationary targets. For the former, the target was about 25 ft. square, and from a height of between 400 and 500 ft., in a strong wind, Lieut. Stillingwerf of the Belgian Army scored 11 hits out of about 24 shots; and equally satisfactory results attended another attempt later in the afternoon, when a full magazine was discharged. At the 200 and 500 yards ranges some excellent work was done, and at the latter, out of 470 shots at full speed, more than 280 hits were found to have been made, during the subsequent examination of the targets.

In every respect, the claims made by the Birmingham Small Arms Co., Ltd., for the Lewis gun were well substantiated.

THE COMING AIRSHIP.*

By Capt. C. M. WATERLOW, A.F.Ae.S.

THE subject of my paper is the airship of to-morrow, and if I look at it rather from the point of view of military requirements, you must bear in mind that it is these requirements which have made it what it is. Commercial needs and even Naval needs have played a very small part hitherto in its development, though they may be expected to exert considerable influence on its progress in future.

Looking back over the past few years, we find an extraordinary prejudice against airships in this country, fostered in the most amazing manner by the Press, both lay and technical. This did not begin to dissipate until the autumn of 1912, just over a year ago.

As late as October, 1912, the *Times* wrote a leading article on the folly of spending money on airships, taking as its text the accident to "Gamma" after the manoeuvres of that year, when the steering gear jammed while over Salisbury Plain and it became necessary to rip the envelope. The design of the cords actuating the ripping panel was faulty and in consequence the panel did not open properly and the envelope took a great time to empty. While emptying it bumped the car along the ground and naturally did great damage. The lesson to be learnt was, I need scarcely say, that our arrangements for ripping were faulty; and when the ship was repaired they were greatly improved.

And then again within the past few weeks we have the *Standard* leader writer telling us that after the two recent catastrophes in Germany the rigid type of airship ought to be abandoned. He says:—"The inflated balloon with a rigid framework and elastic envelope is clearly not strong enough to stand the strain to which it is exposed in a high wind." And again:—"A row of silk or canvas gasbags, with tons of heavy machinery attached to them,

are too fragile to bear the stress of air pressure when driven by an 800 h.p. engine at 50 or 60 miles per hour." There is nothing to support either of these theories in the accounts of the accidents, absolutely nothing, and yet the public are thus gulled into a disbelief in airships. Could not the Aeronautical Society's Committee take action in cases like this and write to the papers to point out their errors? It is most important that public opinion should not be misled.

Going back once again to the autumn of 1912, we suddenly had a most remarkable change of opinion; the very writers who a month or two previously had been declaring the airship to be useless now painted lurid pictures of England's ruin unless a big airship programme was immediately forthcoming.

It is scarcely to be wondered at their thunderings had little effect; people were naturally sceptical. The cause of all this excitement was the alleged "scare ship" over Sheerness and elsewhere; and it would seem that it is to this—possibly phantom airship—that we owe the present activity in airship construction, such as it is.

Even now you will find writers on aeroplanes declaring roundly that any airship is at the mercy of any aeroplane which chooses to assail it; but to make their point they invariably describe the aeroplane of the day after to-morrow as operating against the airship of yesterday; in other words, they give full play to their imagination or knowledge in describing the aeroplane of the future while denying any possibility of development to the airship, of which they know but little.

I don't think it is generally realised that the airship has by no means reached such an advanced stage of development as the aeroplane; the possibilities and probabilities of the future are very rosy and very wonderful.

The case of the airship *v.* aeroplane is rather outside the scope of

* Read before the Aeronautical Society of Great Britain on December 3rd, 1913.

this paper, but I would urge that when discussing it we should have fair play as between the two types.

Lines of Development Here and Abroad.—The development of the airship in England and on the Continent has proceeded on different lines, due, I fancy, largely to the differences in the nature of the countries and of national temperament. *Here*, we have set rather the maximum power of control and handiness as our aim; abroad, they have gone in for weight-carrying capacity and long distance work. In consequence the foreign airships appear clumsy to our eyes and difficult to manage; while ours, no doubt, appear to them as puny and contemptible.

When the Parseval airship, which now belongs to the Navy, descended after its first flight in this country, I asked the German pilot what he thought of our country from the air. He remarked at once that it was so very full of trees, and added that he did not consider it a good country for airships. He was right and yet wrong: right from his own point of view and wrong from ours. It is undeniably not a good country for German airships such as the Parseval and others, but it is excellent for the type that has been developed in England.

Now, please do not misunderstand me in this connection—I do not now refer to the relative sizes of the airships, but to their methods of control.

In Germany or France an airship pilot selects a wide open space to land in; in England we look for a field completely surrounded by trees and just big enough to take the airship.

On manoeuvres last September we had two airships, "Delta" and "Eta," and these were moored out in the open behind a row of trees about 55 ft. high, such in fact as one finds all over England. "Delta" stands 65 ft. high, that is to say, quite markedly more than a Zeppelin or other rigid ship, and yet throughout the week it was in the open, whether the wind was 50 m.p.h. or whether it was a calm; the ship's crew of six or eight were ample to look after it, except when landing. This compares favourably with the 200 or more required to hold a Zeppelin in the open.

And I maintain that a rigid ship of the largest size could have been managed in the same way by a score or so of men, though possibly, and perhaps I should say probably, not of the Zeppelin type of construction.

Both our two ships were out in much rain and other bad weather.

Speed.—A year or two ago Major Baden-Powell informed the world, through the *Daily Telegraph*, that non-rigid ships could not hope to greatly exceed 35 miles per hour, because the flexible envelope would not stand it. To-day the "Astra Torres" airship, or as it now is, Naval Airship No. 3, has achieved a speed, independently of the wind, of over 51 miles per hour. It is therefore the fastest non-rigid airship in the world and may well be even better than the Zeppelins, but precise information on this point is lacking.

Competent designers assure us that 55 miles per hour can be easily obtained and another year or so may produce the 60 miles per hour airship.

From the war point of view this increase in speed has a most important corollary; it means that the era of the slow-speed aeroplane, that is to say, those of under 60 miles per hour, will be gone for ever. Everything that they can do can be done so much better by the airship.

If ever airships achieve 70 miles per hour it is difficult to see where the aeroplane, as we know it to-day, will come in at all for war purposes; and this, of course, applies equally to seaplanes.

This is no idle boast, but the natural result of increase of speed. **Safety.**—We have all been appalled by the recent disasters in Germany. We can only surmise what happened in each case and must on no account, therefore, jump to conclusions too hastily. As I said before, the statement in the *Standard* that the Zeppelin is proved a failure and should be abandoned, seems to me particularly foolish and unfortunate.

We are very badly served by our Press in aeronautical matters; so-called experts do not hesitate to write down amazing rubbish, and editors print it gladly; the general public accept it as gospel, and so the trend of public opinion is induced into wrong lines and the cause of aeronautics suffers. But to return to the question of safety. In any airship fire is above all the greatest danger.

If you will bear with me I would like to analyse this question a bit.

There are three main sources of fire:—

- (1) From the engines.
- (2) From the "wireless" apparatus.
- (3) From other sources, such as defective wiring in the electric lighting circuit, matches, and so on.

There are also three sets of combustible material which may be set alight:—

- (1) The gas within the envelope.
- (2) The petrol for the motors.

(3) Such portions of the car and framework as are not made of metal.

Of the sources of fire:—

(1) At the engine a great deal can be done to render the risk small, but it cannot be entirely eliminated. The carburettor can be and should be enclosed in wire gauze, and the red-hot portions of the exhaust pipes should be dealt with in the same way. Large and ample silencers are valuable because not only do they quiet the engines, but they cool down the exhaust gases.

(2) All dangers from "wireless" sparks can be eliminated by suitable design, but the apparatus wants most careful working as accidental damage to the insulation is almost certain to cause a spark.

(3) Risks from other sources are small and can be easily provided for.

Then as to combustible materials. We have to use hydrogen in the envelope, and there must be occasions when that hydrogen must escape. An entirely satisfactory automatic valve which can be placed on top of the envelope has yet to be devised. In semi- and non-rigid airships the automatic gas valves are placed at the extreme stern. In rigid ships they cannot be placed there, and there is some ground for believing that the importance of this point has been overlooked.

It is possible, though I must confess I think it is very unlikely, that a sufficiently light gas can be found which, when mixed with hydrogen, will render it non-inflammable, and yet not materially impair its lift. It is certainly a point to which chemists should turn their attention.

Petrol we have to carry; we may use heavy oils one day—certainly not for some time. It is scarcely necessary to say that petrol is harmless while enclosed in its tanks, especially if they are far removed from any source of fire. We have therefore two opposing requirements:—For maintaining balance it is necessary to keep the tanks amidships, and as a fire precaution to keep them away from the engines. One solution would be to keep them inside the envelope, but this adds a variety of other difficulties in connection with refilling, leakage, and so on.

If petrol is carried near the engines, it should be aft them so that petrol vapour, due to leakage, is carried away, by the natural draught, out of danger.

It is undoubtedly better if all fabric and other combustible material be kept away from the car; but this involves an increase of weight which cannot be faced in small ships, and we have then to resort to fire-proofing and similar palliatives.

Of risks other than that from fire, I look upon the possibility of a propeller blade breaking and flying into the envelope as the worst. This danger is comparatively small in a Zeppelin, because the gas is confined in 17 different compartments and only one can be rent by a propeller breaking.

In a non-rigid ship such an accident will be fatal and involve the complete destruction of the ship unless the envelope is provided with a proper system of internal partitions. Partitions are also needed for other reasons, as I will show below. This is no small risk, as such things as a cap, a nut, or other article getting into the revolving propeller is practically certain to cause the blades to break and fly. Guards are not practicable for the large propellers now in use, and in any case their weight and head resistance render them out of the question.

There are, of course, other risks in airship work, but they are of lesser importance and need not be considered in estimating the safety of airships.

Design Details.—To turn now to matters of detail in design.

Envelopes.—The envelope is usually made of a fabric of cotton and rubber and is dyed yellow. In England we have also tried varnished silk and gold-beater's skin. Silk was not a success; difficulty was experienced in making the seams strong enough. Gold-beater's skin is excellent in many ways; it lasts in the most wonderful manner without deterioration, holds gas well, and can be easily repaired. But in wet weather it absorbs a great deal of moisture and takes an appreciable time to dry. The materials of which it is made are difficult to obtain quickly, and the process of manufacture is rather slow.

Cotton and rubber fabric has been hitherto the stand-by of all airship manufacturers. It is, however, heavy compared with silk, and succumbs very quickly to the effects of rain and sun. It absorbs a fair amount of moisture in wet weather, but not so much as gold-beater's skin. It is easy to repair and can be manufactured with ease by machinery.

A new material has now been discovered, and it is hoped that with this we shall have the following advantages:—Firstly, it is easily made; secondly, it will hold gas well; thirdly, it will not deteriorate; fourthly, it will absorb no moisture. So far these advantages have been borne out in practice, but further trials will be necessary before we can say quite positively.

It has one additional advantage, and that is it will not yield the secret of its manufacture by examination or analysis.

The advent of such a material as this will have a great bearing on gas consumption during a campaign, and will entail very much less gas transport than would be otherwise the case.

Partition of Gas Vessels.—The second improvement which I foresee is an arrangement of partitions in the envelope. This applies more especially to semi- and non-rigid airships, in which, at present, all the gas is in one container. Partitions are very necessary as a safety device and for war airships. Without them a single bullet hole means a continual leakage until it can be repaired; with a system of partitions the leakage is reduced to a manageable quantity; in cases where long flights are made the importance of this becomes very evident.

It is here that the rigid type scores heavily; Zeppelins, for example, have 17 separate gas containers.

Gun Mounting.—To turn to other points, I see no insuperable difficulty in mounting guns on the top of a semi- or non-rigid airship; weapons are essential in such a position for protection against aeroplanes, and an airship which lacks them cannot expect to survive long in time of war.

Power Plant, &c.—In the car and machinery, present tendencies point rather to separate engines of not more than 200 h.p., each driving a single propeller, the engine, propeller arm shafting and propeller all forming a single unit which can be removed bodily if desired or in case of damage.

For the sake of smooth running 6-cylinder engines and 4-bladed propellers seem likely. An airship would be equipped with two, four, or six power units, according to its size.

Controls.—On no subject do opinions differ more than on the arrangement of controls. Almost all pilots I have met have their own favourite arrangement. Personally, I hold that the pilot should have all controls within his reach and view; though whether he manipulates them directly or moves a telegraph instrument to warn his subordinates, depends on the size of the ship.

Landing.—Landing an airship gently requires the utmost nicety of judgment and a very thorough and long apprenticeship; there are so many factors to take into account. With swivelling propellers it is possible to land with ease and safety when both very much lighter and very much heavier than air.

In "Delta," though quite a small ship, ascents and descents have been made with the ship as much as 650 lbs. heavier than air, and on two occasions I landed when 200 lbs. lighter than air. One of these was after an eight hours' flight, the other after a parachute descent from the airship.

This gain in buoyancy on a long flight is a difficulty which in larger ships would have to be overcome by special means. In the Naval rigid airship, built at Barrow a year or two back, an attempt was made to conserve the water vapour given off in the products of combustion of the petrol and air. There are many practical difficulties which render this impossible on a small airship, but it is a point which will certainly require attention.

Suggested Army Airship.—For our Army expeditionary force I think the coming airship—or perhaps I should say the "not-coming" airship, as they have been abandoned by the Army—will be one of about 300,000 to 350,000 cubic ft. capacity; that is, a little bigger than Naval Airship No. 3, the "Astra-Torres." It would be of the non-rigid type, with a car like our "Eta," speed 55 miles per hour, crew of eight or nine. To carry nine hours' fuel supply at full speed. Designed to ascend to 5,000 ft. with four hours' fuel supply; ballonet capacity up to 8,000 ft.; mount two automatic guns, one on the top of the envelope and one in the car, both designed to shoot all round the compass.

Two such airships could be run by an airship squadron of the same size as that which is laid down in the existing war establishments and with the same amount of transport. The ship could be readily packed for transport, and could be used equally well on the continent or for "savage" warfare.

The coming Naval airship I prefer to say nothing about; perhaps there are Naval officers present who will be able to enlighten us.

Commercial Airships.—For commercial purposes I believe the airship to have a great future. Even by now we ought to have had a Paris to London service, or at least a cross-Channel one.

Airships will doubtless come into use in connection with the post office, and, as time goes on, for newspaper delivery. I can imagine reading in an enterprising daily paper that they have established a special airship service to deliver their paper in every village in Norfolk every morning between 6 and 8 a.m. You can reckon that the ship will leave London at 2 or 3 a.m., and flying low over the various villages, will drop a small parachute with a bundle of mails or newspapers.

Why, we could do that with our little "Eta," small though she is, most days of the year.

Sporting Airships.—A few years hence a ship the size of "Beta" will be the aerial yacht of many men who now keep a big motor car; such a ship could be produced at a very moderate figure with the prospect of a sale of 100. Hydrogen will be as cheap as coal gas, and one "fill" will last a year. The mechanism will be as simple as a modern motor car, and will be within the capacity of a man of the ordinary motor mechanic class.

An Imaginary Trip.—In conclusion, I would like to take you with me in imagination on a trip on the coming airship from London to Paris. We entrain at Charing Cross in a slip carriage with the 40 other passengers about five p.m.

Arrived at Woolwich the carriage is slipped and is taken on by an electric locomotive to the airship sheds on the south of Shooter's Hill. The conductor enters to ask the gentlemen to stop smoking, and at 5.20 we pull up at the little covered station outside the airship shed.

We pass through a turnstile and show our tickets, and note that our weight is being taken and recorded as we go by. Those over 13 stone pay excess, and in consequence gentlemen who are near the limit have discarded coats and wraps and given them to their lighter friends.

Arrived inside the shed we enter the passenger car.

The "Albatross," as the airship is called, takes a complement of 50 all told, and does her 60 miles per hour with ease and comfort. The men are already in their places in the fore and aft cars and the engines gently humming. The necessary ballast allowances have been made so soon as our weights had been recorded, and the airship is only held down by the weight of the two little trolleys under the fore and aft cars. There are also guylines attached to other trolleys each side, running on their own rails. A man is seated on each trolley, that is six in all. The swivelling propellers, of which there are two pairs, two fore and two aft, all in the horizontal lifting position.

The shed doors open by hydraulic power, and as soon as they are fully extended we commence to move out, a motor in the leading trolley driving us at 10 miles per hour.

Ahead in the darkness are two lights on the ground, a green and further on a red one. When the leading car approaches the red one it means the ship is clear of the shed, similarly when the aft one reaches the green one. When the ship is clear the three rear trolleys loose their connection, and the stern swings round to port in a fresh starboard wind, at the same time the aft propellers revolve and prevent the stern from hitting the ground; a moment later the fore propellers revolve, the fore car is released and the ship springs into the air. We are off. At 500 feet the propellers drive us forward, and we seek higher altitudes on the planes.

Looking back over the ground, we notice the Shooter's Hill lighthouse winking at us; the white upper light being the county one and the lower red one for the sub-district. All England is lit up in this manner, and it takes very little time to ascertain from a light your position in the dark. As we pass on towards the coast our wireless operator is receiving a message from Folkestone, telling us to be ready to take in 300 lbs. of local mails.

Ahead of us is the big Mid-Kent light, near Maidstone, giving its two one-second flashes followed by 10 secs. darkness. Nearing Folkestone we approach the earth again, and as we get lower the Post Office officials are seen waiting with a big bundle; we drop a rope from the front car, which is hooked on, and our power winch quickly hauls the bundle aboard. At the same time a small parachute with London letters is dropped over. The sea voyage is dull and uneventful, and the passengers are glad to sit down to dinner during the crossing. As we approach Paris we are struck by the big lights on the Eiffel Tower, visible many miles away; later we spot the sheds near Billancourt, and light up our landing signal. In reply they hoist three red lights as a signal they are ready to land us.

The swivelling propellers are all turned downwards now, and we approach the ground at the rate of 500 ft. a minute. Three hundred ft. above the landing ground the clutches are taken out and the propellers turned into the lifting position; our momentum continues to carry us downwards, and 150 ft. from the ground the propellers commence to check it, and as we reach the ground our momentum is absorbed and we land as lightly as a feather, half an hour past midnight. But for the 15 mile head wind we should have made a much quicker passage.

Getting into the shed is an easy process, for here they have a circular shed, and it can be entered from any direction.

The width of the shed shelters us from all wind, and a score of men quickly have the cars fastened down to a pair of trolleys, which are then wound into the shed by a cable.

So concludes our voyage in the coming airship.

FOREIGN AVIATION NEWS.

Guillaux to Loop the Loop.

GUILLAUX is now at St. Cyr busily practising with a Blériot-Gnome with a view to imitating Pegoud, &c., in looping the loop, upside down flying, &c.

The New Pommery Cup Conditions.

THE Committee of the Ligue Nationale Aérienne is now busily engaged in drawing up the rules for the new Pommery Cup offered by the Marquis de Polignac. Reverting to the original idea, the Committee has decided that the winner shall be the pilot who makes the longest flight in a straight line in 48 hours, the question of flying during the night being left entirely to the discretion of the competitor.

Mme. de Laroche's Success.

IN her fine flight on the 25th ult. at Mourmelon, which, as mentioned in FLIGHT last week, gave her the leading position in the Femina Cup competition, Mme. de Laroche covered 323.5 kiloms. in four hours. She then had to give up owing to trouble with the petrol pipe. She was using a Henry Farman biplane, with Gnome engine and Integral propeller. The competition remains open until the end of the year.

New Farman Superior Pilots.

AT Buc, on the 25th ult., Lieut. Provillard made a triangular cross-country flight on a Farman biplane to qualify for a superior *brevet*, and two days later Gressard flew from Buc to Mailly Camp, also on a Farman, with the same object.

A Morane Superior Pilot.

ON Saturday, Lieut. Mosnier, of the Morane-Saulnier school at Villacoublay, made a cross-country flight for his superior *brevet* over the Paris-Tours course.

Swiss Officers at Etampes.

LAST Saturday the Swiss Lieuts. Lugin and Germain, practising at the Farman school at Etampes, made a long reconnoitring flight in company, while a few days previously Lieut. Lugin made a long flight at a good height along the valleys of Chalo St. Mars and Saclas.

Maurice Farman on his New Machine.

ON one of his latest type biplanes, Maurice Farman on Monday flew with Madame Raillon from Buc to Chambord. After lunch they returned along the Loire valley to Etampes, from whence, after inspecting the Farman school, they flew back to Buc.

Vedrine's Thrilling Experience.

LEAVING Vienna at 9 a.m. on Monday morning with the intention of going to Budapest, Jules Vedrine eventually landed at Belgrade. He found it difficult to keep on his course owing to the clouds, but eventually he reached the river Drava and followed it to the Fortress of Varadine on the Danube. There his machine was fired at, but rising quickly to a height of about 3,000 metres, he continued in a southerly direction, and following the river Sava, arrived at Belgrade where he was given an enthusiastic reception.

He now proposes to fly to Constantinople, Jerusalem, Cairo, Bagdad, Bombay and Calcutta, and there take ship to America.

The Catastrophe near Esternay.

MOST mysterious and gruesome was the fate of Lieut. Briault and his mechanic, Sapper Rouillard, who were the two men killed in the ill-fated biplane which was burnt between Bethon and Chantemerle in the Champagne district, on the 26th ult. They had started from St. Cyr for a flight to Mailly camp, and it is assumed that the machine capsized through touching the tops of some trees when making a descent. The accident, however, was not witnessed by anyone, and it occurred at a spot four kiloms. from any habitation, but the sound of the fall and the explosion were heard by a man shooting in the Traccones wood, and he gave the alarm. It was noticed when the machine passed over Bethon that the pilot appeared to be searching for landing ground. The bodies of both pilot and passenger were considerably burned.

Three Deaths in Russia.

IN three days last week three Russian aviators met their death, although only one was killed while flying. Kostine, who it will be remembered was engaged by the Bulgarian army and was captured by the Turks near Adrianople through having to make an enforced landing near their camp, died in a hospital at St. Petersburg from quinsy. At Suwalki, about three kiloms. from Augustowo, a machine, piloted by Serbinov, fell from a height of 400 metres, apparently through the motor failing, and the pilot was killed. The third death was that of Lieut. Ganchine, who shot himself at a restaurant in St. Petersburg.

St. Petersburg to Moscow and Back.

FROM St. Petersburg it is announced that Vasselief has succeeded in flying from St. Petersburg to Moscow and back, a distance of 1,800 kiloms. in 10 hrs. 52 mins.

Spanish Prince-Pilot Under Fire.

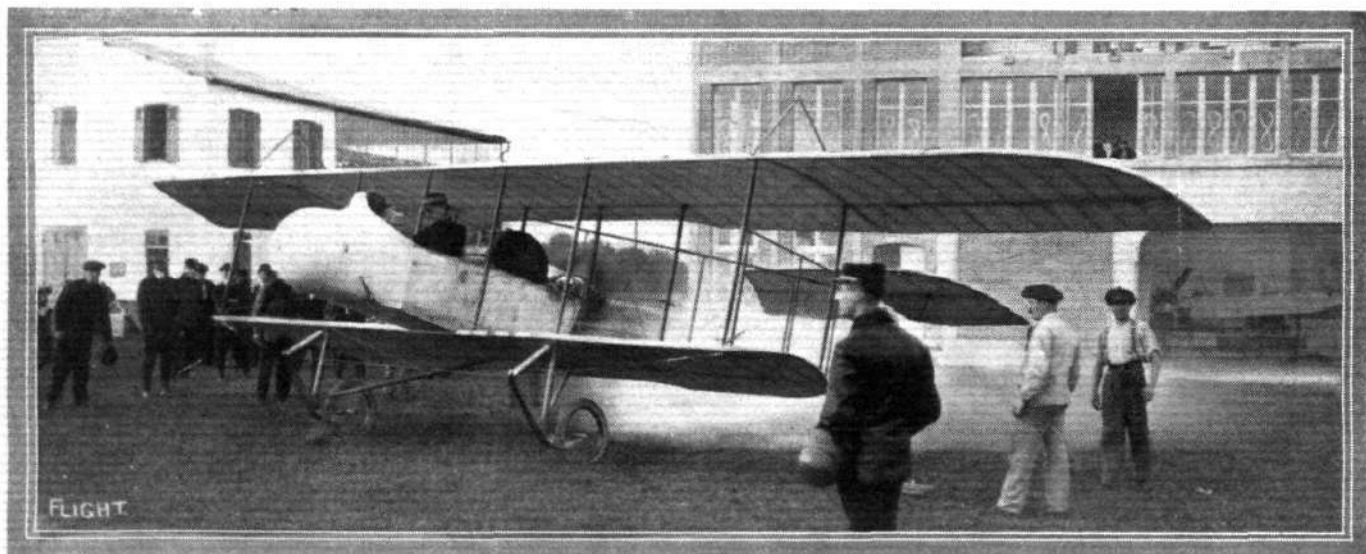
DURING a fine flight from Tetouan to Arzila, in Spanish Morocco, on a Lohner biplane on Monday, the Infanta Alphonse of Orleans, who was accompanied by Col. Vives as observer, was shot at by the Moors. The aviators increased their altitude until they were well out of range, and some bombs which they dropped discouraged the enemy from attempting to pursue them.

Daucourt's Trip to Egypt.

FROM Constantinople, Daucourt has telegraphed that in the fall on the Taurus mountains, his Borel machine was only slightly damaged. During the following night, however, while the machine was being watched by guards, it was set alight in some way. There was an explosion, and the machine was completely destroyed.

Bonnier May Go to Cairo.

ON the 29th ult., Bonnier, with his mechanic, arrived on their Nieuport monoplane, from Craiova, where they had been held up by the fog. Bonnier now says he will go on to Constantinople, and may continue into South Russia, or go to Cairo instead of to Bagdad, as he had intended.



THE BLÉRIOT BIPLANE.—Amongst the Blériot machines which will be exhibited at the coming Paris Salon, is a biplane of the type shown in the accompanying photograph. This machine is constructed of steel throughout and has, it will be noticed, a new type of landing chassis which is said to be very effective even on the roughest ground.

Models

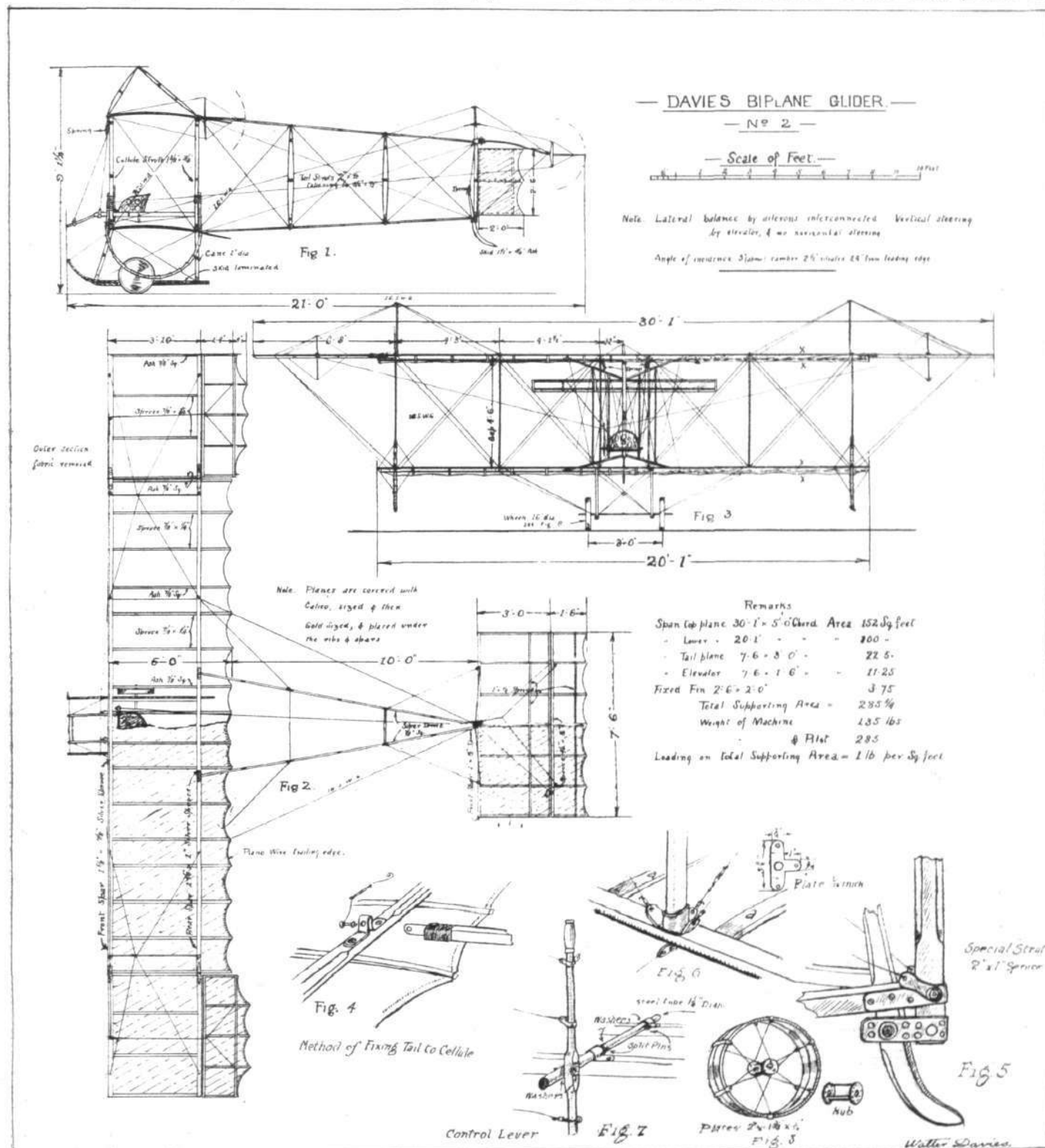
Edited by V. E. JOHNSON, M.A.

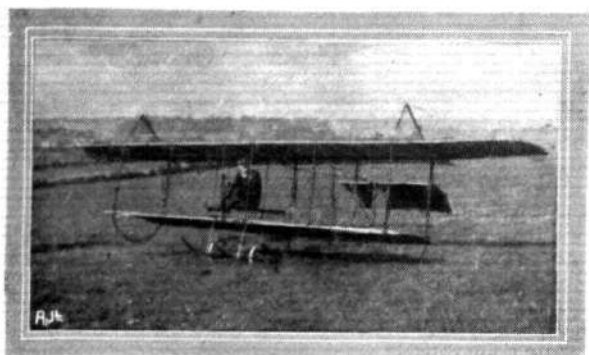
The Davies Glider No. 2.

DURING the last few weeks a considerable number of enquiries have been received with respect to various particulars relative to man-carrying gliders, and there is every indication that a large number of aero clubs intend to make it one of their chief features next season. It is, we all know, a most fascinating form of sport, and provided that something can be done with, say, a pedal-driven propeller to considerably augment the length or duration of the glide, its popu-

larity would undoubtedly be still further increased. A machine of this character is naturally more expensive to build and maintain than a small rubber-driven model. The cost of its production does not, however, exceed that of a properly engined model, and there are many private individuals as well as clubs who, whereas they could not possibly either build or maintain a full-sized engined machine, are quite capable of tackling a glider.

Under the above circumstances, we have much pleasure in





Mr. W. Davies' Glider.

publishing the following account and scale drawings of a glider kindly sent us by Mr. W. Davies:—

"My first letter appeared in *FLIGHT* as far back as August, 1911, and gave a description of my first glider. From start to finish it was nothing but a lump of bad luck. Encouragement and local interest was at the time anything but brisk, and not having suitable grounds I decided to take it to pieces and go back to experimenting with models. It was not very long after having come to this decision that I came across a very suitable ground for gliding experiments, and this having caused the flight fever to come on again, I was quite unable to resist the desire to build another, this time a machine of similar dimensions but with constructional details much improved, and so made as to be easily assembled or taken to pieces, strong and yet light.

"Work went on but very slowly, as I built the machine entirely myself. When finished the space occupied was 21 ft. by 6.5 ft., but it was a long time to rig up the machine. Fortunately, however, I was not handicapped for room, so that the tail and outriggers were put together as one, and the cellule braced with the extensions down. On arriving at the flying ground very little had to be done, except putting up the extensions and bolting on the tail outriggers, which are shown clearly in Fig. 4.

"The gliding ground was at a distance of 6 miles from the building shed, and the transportation of the machine was undertaken quite on a military basis, the axle and wheels were half turned round on the skids, the tail slung on the extension, and the machine pushed off at top speed. The time the very early morning. We arrived at our destination feeling a little knocked up. The crew with me, which numbered six, worked as happy as if at an aviation meeting, all setting to and helping me to get the machine ready. I had decided from my experience with No. 1 that it would be better to get into the seat rather than risk her on her own. Having done so, a really delightful trip took place, at a height of about 5 ft. only from the ground, being pulled quite 50 yards; the wheels making it possible to get up speed quickly, and acting admirably in every way.

"These towed flights were the most successful, free glides being limited; we never seemed to get sufficiently high to accomplish long free glides, the longest free flight being about 130 ft., but much longer towed flights were made.

"I account for this by reason of the insufficient slope of the ground and the small supporting area, which works out at 1 lb. per sq. ft., which is too heavy. I should strongly advise builders to have a loading only of $\frac{3}{4}$ lb. per sq. ft. rather than a smaller area and consequently heavier loading. It is much better as a test of your manipulatory skill, and avoids also landing at a speed and with a bump that the above machine did. Above all, be most particular with respect to the wind speed.

"One particular morning that we shall never forget, we motor cycled over to the ricksheds (the hangar) and found the wind much too high, but the sound of my 'Rudge multi' engine must have woke up some of the people in the neighbourhood, who knew quite well that the glider was there, and they must have thought that I had got an aero motor for the machine, for they came simply like a swarm of bees.

"The wind was still too strong, and the people got so very tired of waiting, and not wanting them to lose interest, I decided something should be done. To try a solo flight was madness, so I looked round for a passenger. The machine was wheeled from the shed into the open field, each of the crew at his proper place, a friend of mine (small in build, of course) volunteered to take the place as passenger. This we thought (if anything should be really accomplished) would be quite sensational.

"Before giving and explaining the result, it would be as well perhaps to mention that the angle of the tail plane was very high, thus throwing the centre of pressure further aft and making my position not so dangerous as if placed too far forward (H. Farman fashion); at the same time, this was upsetting theory, as there was no longitudinal dihedral making it safe for myself from a landing point, but stability was so far sacrificed. William Westwood was my passenger, and we sat very close together: the crew pulled the machine and off we went, still remaining on the ground, when all of a sudden up we popped and down we came, a most terrible bump, I pushing the passenger off the back, after crawling from under the wreckage; poor Billy was limping, he had cut his leg, so we took him to see the doctor, where a few stitches were inserted. After the doctor had patched up and made good we returned to the glider, and to my surprise the most important part, the four main spars, had broken through at the spot marked X X on the drawing, after my passenger and I had come through the top plane, and seeing that the *cabanes*, extensions and *ailerons* were smashed as well, I thought the best thing to do was to start afresh rather than patch up.

"As a result of the foregoing experience I strongly advise those who are thinking of building a glider to use bamboo for their spars, outriggers and ribs, as it will bend when receiving a shock, and will not break at that. Built on this principle, and strongly braced with 16 g. piano wire, with a strainer to each diagonal, and to employ 300 sq. ft. of supporting surface, and to experiment in a reasonable wind and slope. [A loading of $\frac{3}{4}$ lb. per sq. ft. requires a wind of about 20 m.p.h. to soar.]

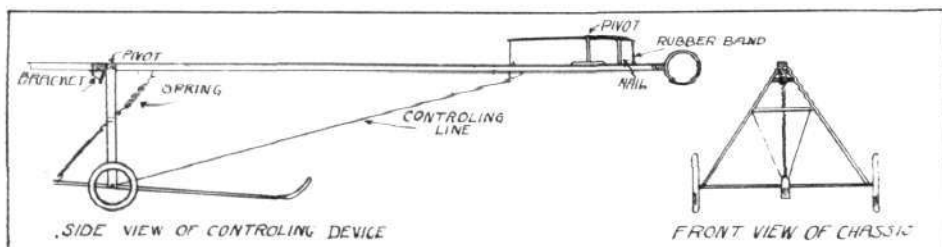
"No doubt readers looking at Fig. 2 will not admire the tail outriggers in plan, but I found it answered well, as it is the only tail out of four that I have not smashed; it was also very rigid. Fig. 4 shows the method of bolting outriggers to the main cellule: the outriggers themselves are sawn down 6 ins., the plate let in pegged and bound with string. Fig. 5 shows a continuation of the outrigger to the tail strut, where a skid is fitted. Fig. 6 shows how the aluminium strut sockets and brackets for cellule bracing are bolted to the main spars. Fig. 7 is the elevating control, showing universal joint, wood handle bar bolted to $1\frac{1}{2}$ in. solid drawn steel tube.

"Fig. 8 was the most difficult job of all. It was composed of six pieces of ash, three making the complete circle, being screwed and glued together lamination fashion. The spokes were of ten g. piano wire diagonally crossed from the hub to the rim, as shown in the drawing, the wire being fastened through a hole in the plate, and passed through suitable ferrules. This answered admirably."

The Question of Wheels for Models.

"With reference to your remarks in a recent number of the *Model Engineer*," writes Mr. Harold T. Holman, "concerning wheels for r.o.g. machines, I wish to say that I am entirely in agreement with them. The so-called r.o.g. machines that are seen both at club meetings and model exhibitions are little better than hand-launched machines with a few pieces of wire and perhaps two wheels the size of a sixpence fitted to them. Apparently their constructors want to get one or two more seconds out of them and so eclipse some previous duration records, and the chassis is cut down to the utmost possible amount to enable this to be done.

"I should like to point out that all members in the Dover Model Aero Club (not yet defunct, though some people think so) use a



Mr. Ellis' self-launching model device.

sensible chassis and proper wheels. The general opinion seems to be that the 2 in. aluminium disc wheels with rubber tyres are as suitable as any for their price, and strong though light.

"Models equipped with these will rise unaided off unprepared grass (in some cases rough and uneven) with ease, and, what is more, will land properly after the flight. This latter item, I might say, is a compulsory test in the special r.o.g. certificates issued by the club. Another item is that models shall rise unaided, both with and against the wind, in two consecutive flights. This test immediately knocks out the "freak" r.o.g. machines, which just manage to keep going with a few strands of rubber and small

reserve of power, thus doing very large duration flights. These by themselves, in my opinion, are little more than worthless. I hope that in future competitions all clubs will specify that proper wheels must be used, and an ordinary grass surface used as a rising ground. One hears of full-sized machines rising from and alighting on ploughed fields and rough surfaces, and I think it would be a good test to see what an r.o.g. machine could do in the way of rising off rough ground."

Device for Self-launching Model.

"I am a constant reader of the model section in FLIGHT," writes Mr. C. H. V. Ellis (junr.), "and I am sending you some drawings of a self-launching model of my own construction; not having quite completed it, I do not exactly know its capabilities. I thought of it when reading a book entitled *Model Flying Machines*. It stated that the difficulty in the case of r.o.g. machines was the correct elevating of the same."

"If the elevator be inclined at a good angle so as to bring the model sharply into the air, it would continue to rise far too much and probably turn a somersault, instead of continuing in a horizontal flight. As you will see from the drawings, the chassis is sprung. The friction when the model is running on the ground presses the chassis on to the aluminium bracket, thus drawing in the controlling line and so causing the elevator to be tilted, as soon as the model rises, the spring pulls the chassis into its forward position, thereby slackening the line and allowing the rubber band to pull the elevator on to the aluminium nail."

"I should be pleased to hear what you think of this idea."

It is now well known that there is no need whatever for any such device as that which our correspondent is good enough to send us. The elevator is simply set at the correct angle for normal horizontal flight (approx.). The first extra "burst" of the rubber motor is quite sufficient—often more than enough—to send the model well up into the air. Moreover, the model rises "naturally" by such means.

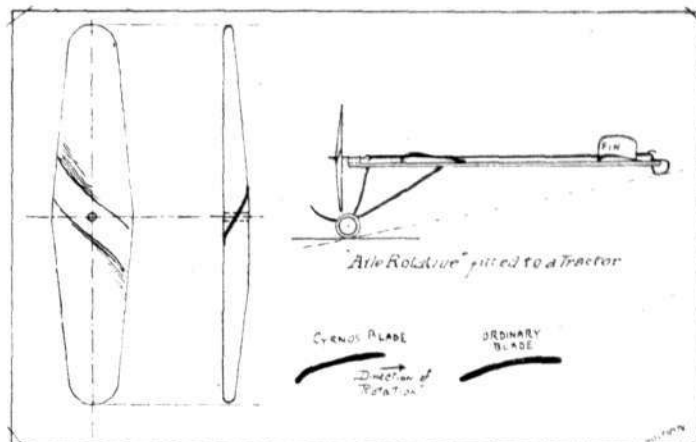
We have seen one or two somewhat similar devices to the above tried in practice, but the machine was more successful when they were done away with.

A Propeller for Tractor Models.

"I am sending you some sketches," writes Mr. Harold T. Holman, "of a form of propeller which I think is admirably suited for tractor models. It is modelled upon exactly the same lines as the remarkable 'Aile rotative Cynos,' which was used with so much success by Signor Nardini on the Deperdussin mono-

plane on which he crossed the Channel. He very kindly gave me a model of his 'rotating wing,' as it is termed, and I obtained such good results with a copy that I constructed, that I thought you would be interested to have some particulars of it."

"The shape is somewhat singular, the blade tapering from about 1.75 ins. at the boss to $\frac{3}{8}$ in. at the tip. It is also tapered (viewed edge-on) so as to ensure a constant pitch along the whole length of the blade. In section the blade is like the section of a monoplane wing reversed, i.e., the dipping edge tail, instead of leading this shape, seems to give so far as I can see, a stronger pull than an ordinary flat or slightly hollowed-out blade, whose section is the arc of a circle."



Mr. Holman's model propeller.

"There are points about this propeller which tend to make 'tractor-planing' easier, for:—

- "1. The shape renders it easy to construct.
- "2. It has far less tendency to snap off at the boss.

"These, I think, will greatly help the novice who is taking up 'tractor-planing' as a hobby and who is not very proficient in propeller and tractor construction."

Replies in Brief.

L. DEAKIN.—You will find what you require in the following back numbers:—July 16th, 1913; March 23rd, 1912.

INTERNATIONAL AERO, MOTOR BOAT, MARINE AND STATIONARY ENGINE EXHIBITION, OLYMPIA, March 16th to 25th, 1914.

MODEL SECTION.

In connection with this Exhibition, a Model Section, under the patronage of the Royal Aero Club, will be organised by The Kite and Model Aeroplane Association. The Royal Aero Club will offer prizes amounting to £50 in the following classes:—

1. **Power-driven Models** (excluding rubber and spring motors).—Minimum duration of flight, 30 secs. **First Prize, £10; Second Prize, £5.**

2. **Models driven by any other Motive Power—**

(a) **Rising off ground.**—Minimum weight, 8 oz.; minimum loading for biplanes, 3 oz. per sq. ft.; minimum loading for monoplanes, 4 oz. per sq. ft.; minimum duration of flight, 30 secs. **First Prize, £5; Second Prize, £3; Third Prize, £1.**

(b) **Single screw rising off ground.**—Minimum weight, 6 oz.; minimum loading for biplanes, 3 oz. per sq. ft.; minimum loading for monoplanes, 4 oz. per sq. ft.; minimum duration of flight, 20 secs. **First Prize, £2; Second Prize, £1.**

3. **Hydro-Aeroplane Models—**

Minimum weight, 8 oz.; minimum loading for biplanes, 3 oz. per sq. ft.; minimum loading for monoplanes, 4 oz. per sq. ft.; minimum duration of flight, 20 secs. **First Prize, £4; Second Prize, £3; Third Prize, £1.**

A tank will be provided in which models will float during the Exhibition. (The Judges will award 25 of the design and construction marks for models capable of rising off ground and water without interchanging floats or wheels.)

4. **Model Aero Motor** (excluding rubber and spring motors). **Prize, £5.**

The model will be judged on a weight per horse power basis. The weight of motor, including all accessories, with fuel, for a minimum run of two minutes (to be taken on a bench test), must not exceed 10 lbs.

5. **Single Screw Tractor Models—**

Rising off ground.—Minimum weight, 6 oz.; minimum loading for biplanes, 3 oz. per sq. ft.; minimum loading for monoplanes, 4 oz. per sq. ft.; minimum duration of flight, 30 secs. **First Prize, £3; Second Prize, £2; Third Prize, £1.**

6. **Weight-carrying Models—**

Rising off ground.—Minimum weight, unloaded, 16 oz.; minimum duration of flight, 15 secs. Each model must carry a deadweight of a quarter of its own weight. This weight or weights must be supplied by each competitor, and be easily detachable for weighing. **First Prize, £4; Second Prize, £2.**

7. **Models embodying New Design applicable to Full-sized Machines—**

A Prize of £3 will be awarded at the discretion of the judges for the model in this or any class that embodies the most original and practicable ideas.

8. **Ornithopter Models—**

Minimum weight, 6 oz.; minimum duration, 15 secs. In this class only models with their main supporting surfaces flapping are eligible. Rotary propellers are not allowed. Trade models are ineligible. **Prize, £10.** Presented by Major B. Baden-Powell and Col. J. D. Fullerton, R.E.

The Judges in awarding the Prizes will take into consideration design, construction, duration of flight, and stability. In Class 1, the marks will be Design and Construction, 50; Stability, 50; Duration (actual seconds).

In Classes 2, 3, 5, 6, and 7 the marks will be: Design and Construction, 100; Stability, 100; Duration (actual seconds).

The Royal Aero Club will erect suitable stands, and provide the necessary attendants. No charge will be made to exhibitors for space, but an entry fee of 5s. per model will be payable. A reduced charge will be made in the case of collective exhibits from Model Aero Clubs affiliated to The Kite and Aeroplane Association.

Arrangements will be made for a practical demonstration of the Models entered in Classes 1, 2, 3, 5, 6, and 8 to take place shortly after the close of the Exhibition. The date and place will be announced in due course.

Royal Aero Club,
166, Piccadilly, London, W.
December 2nd, 1913.

